

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

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GP 2813  
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In re the application of:  
HUI-JUNG WU, ET AL

Serial Number: 09/141,287

Filed: August 27, 1998



Docket : 30-4540 (4780)

Group Art Unit: 2813

Examiner: E.J. Kielin

#14 / Appeal  
Brief  
T. Yung  
6-30-00

For: **PROCESS FOR OPTIMIZING MECHANICAL STRENGTH  
OF NANOPOROUS SILICA**

Assistant Commissioner for Patents  
Washington, D.C. 20231

BRIEF FOR APPELLANT

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Sir:

This is an Appeal to the Board of Patent Appeals and Interferences from the Final Rejection of claims 1-13 and 16-29 in the above identified case. A response after Final Rejection was filed by Applicants on February 24, 2000. The Examiner issued an Advisory Action on March 9, 2000, affirming the rejections. A Notice of Appeal was entered on April 19, 2000. An oral hearing is not requested.

This Brief is hereby filed in triplicate. Copies of the case authorities cited herein are enclosed. The Commissioner is authorized to charge the required appeal brief fee of \$300.00 to Deposit Acct. No. 01-1125. In the event the Commissioner determines that an extension of time is required in order to consider this submission timely, then this submission includes a petition for an extension of time for the required term and the Commissioner is authorized to charge any other fees necessitated by this paper to Deposit Acct. No. 01-1125.

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I. REAL PARTY IN INTEREST

The real party in interest is Honeywell International, Inc., which is the successor corporation to AlliedSignal, Inc., the assignee of record.

II. RELATED APPEALS AND INTERFERENCES

There are no other related applications on appeal or subject to an interference known to appellant, appellant's legal representative *or the assignee*, that will directly affect, or be directly affected by, or have a bearing on the Board's decision in this appeal

III. STATUS OF CLAIMS

The claims in the application are 1-13 and 16-29. Claims 1-13 and 16-29 are pending, stand rejected and are on appeal. No claims are allowed.

IV. STATUS OF AMENDMENTS

A response was filed after final rejection on February 24, 2000, which was considered by the Examiner but was not deemed to overcome the rejection as per the Examiner's Advisory Action, dated March 9, 2000. No claims were amended after the final rejection.

V. SUMMARY OF THE INVENTION

The invention described and claimed herein pertains to a novel process for producing nanoporous silica dielectric coatings on a substrate. These coatings are silica dielectric films that are produced with nanometer-scale voids or pores, to provide an insulating material for the manufacture of semiconductor devices. They having a low density and therefore a desirably low dielectric constant, relative to the same material formed into a non-porous film. The embodiment of the invention as claimed includes a process for forming a nanoporous dielectric coating on a substrate by

- (a) forming a substantially uniform alkoxysilane gel composition on a surface of a substrate, which alkoxysilane gel composition comprises a combination of at least one alkoxysilane, an organic solvent composition, water, and an optional base

catalyst; wherein the organic solvent composition comprises a relatively high volatility solvent having a boiling point of about 120 °C or less, and a relatively low volatility solvent selected from the group consisting of di(ethylene)glycol monomethyl ether, tri(ethylene)glycol monomethyl ether, tetra(ethylene)glycol monomethyl ether; di(propylene)glycol monomethyl ether, tri(propylene)glycol monomethyl ether, triethylene glycol monomethyl ether, and mixtures thereof;

(b) heating the substrate for a sufficient time and at a sufficient temperature in an organic solvent vapor atmosphere to thereby condense the gel composition; and then

(c) curing the gel composition to form a nanoporous dielectric coating on the substrate.

Importantly, claim 1, the broadest of the pending claims, specifically defines the organic solvent composition as one that comprises a relatively high volatility solvent having a boiling point of about 120°C or less, and a relatively low volatility solvent selected from the group consisting of di(ethylene)glycol monomethyl ether, tri(ethylene)glycol monomethyl ether, tetra(ethylene)glycol monomethyl ether; di(propylene)glycol monomethyl ether, tri(propylene)glycol monomethyl ether, triethylene glycol monomethyl ether, and mixtures thereof.

Additional elements are defined in the claims dependent upon claim 1.

## VI. ISSUES

(a) Whether claims 1-9 and 13-29 are unpatentable under 35 U.S.C. 102(e) in view of U.S. Patent No. 5,736,425 ("the '425 patent") when the '425 patent nowhere teaches or suggests the element of the specifically recited monomethyl ether solvents in the claimed process.<sup>1</sup>

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An earlier Office Action, dated June 22, 1999, rejected then pending claims 1-9 and 13-29 as allegedly anticipated under 35 U.S.C. § 102(e) by U.S. Patent No. 5,736,425. The last Office Action, made Final, dated December 9, 1999, is completely silent as to any rejection based on anticipation, and therefore the 102(e) rejection is believed to be withdrawn. Nevertheless,

(b) Whether claims 1-13 and 16-29 are unpatentable under 35 U.S.C. 103(a) over the '425 patent taken together with the Examiner's allegation that "dispensing to spin a liquid is known and obvious to be done by pouring the liquid into a stream onto the substrate" when no art of record teaches or suggests the use or desirability of substituting the specifically claimed monomethyl ether solvents for the glycols previously used in the claimed process.

(c) Whether claims 1-13 and 16-29 are unpatentable under the judicially-created doctrine of obviousness-type double patenting over claims 1-53 of Smith et al. (U.S. Patent No. 5,736,425) taken in view of claims 1-39 of U.S. Patent No. 5,807,607 ("the '607 patent"), when no element of claims 1-53 of the '425 patent and no element of claims 1-39 of the '607 patent claims each and every element of pending claims 1-13 and 16-29.

#### VII. GROUPING OF CLAIMS

The groupings of claims are as set forth in (a) - (b) of section VI above.

#### VIII. ARGUMENTS

##### (A) The Pending Claims Are Novel Over U.S. Patent No. 5,736,425

In the Office Action dated June 22, 1999, the Examiner rejected then pending claims 1-9 and 13-29 as allegedly anticipated under 35 U.S.C. § 102(e) by U.S. Patent No. 5,736,425. As explained by Footnote 1, *supra*, it is believed by Applicants that this ground of rejection has been withdrawn as of the Office Action, made Final, dated December 9, 1999. Nevertheless, arguments are supplied herein should the Examiner take the position that the rejection under 35 U.S.C. § 102(e) is still applied.

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Arguments are supplied herein should the Examiner take the position that the rejection under 35 U.S.C. § 102(e) is still applied.

The burden is initially on the Examiner to assert a *prima facie* allegation that a claimed invention is anticipated by a reference. *In re Oetiker* 24 USPQ2d 1443 (Fed. Cir. 1992) [See also, *Ex parte Natale* 11 USPQ2d 1222 (Bd. Pat. App. and Int., 1989) and *Ex parte Skinner* 2 USPQ2d 1788 (Bd. Pat. App. and Int., 1986)]. It is long settled by the courts, including the Federal Circuit that,

Anticipation requires the presence in a single prior art reference disclosure of each and every element of the claimed invention, arranged as in the claim.

*Lindemann Maschinenfabrik GMBH v. American Hoist and Derrick Company et al.* 221 USPQ 481, 485 (Fed. Cir., 1984) citing to, *Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542, 220 USPQ 193 (Fed. Cir. 1983); *SSIH Equip. S.A. v. USITC*, 718 F.2d 365, 218 USPQ 678 (Fed. Cir. 1983).

U.S. Patent No. 5,736,425 ("the '425 patent") describes processes for producing nanoporous silica dielectric coatings on a semiconductor substrate.

Nanoporous silica dielectric films (also referred to in the art as, *e.g.*, foamed dielectrics or aerogels) are employed in the production of semiconductor devices in order to provide insulating materials having the lowest possible density and therefore the lowest possible dielectric constant, in order to permit optimum reduction in the size or scale of semiconductor features.

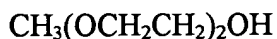
The '425 patent teaches the desirability of producing nanoporous silica dielectric coatings (referred to in that document as "aerogels") by starting with a liquid composition that includes glycol solvents such as ethylene glycol, 1,4-butylene glycol, and 1,5-pentanediol. As explained by the case law cited above, in order to maintain a *prima facie* assertion of anticipation, every element of the rejected claim must be found in the cited reference.

In the present case, the broadest claim is claim 1, reciting:

A process for forming a nanoporous dielectric coating on a substrate which comprises:





- (a) forming a substantially uniform alkoxysilane gel composition on a surface of a substrate, which alkoxysilane gel composition comprises a combination of at least one alkoxysilane, an organic solvent composition, water, and an optional base catalyst; wherein the organic solvent composition comprises a relatively high volatility solvent having a boiling point of about 120°C or less, and a relatively low volatility solvent selected from the group consisting of *di(ethylene)glycol monomethyl ether*, *tri(ethylene)glycol monomethyl ether*, *tetra(ethylene)glycol monomethyl ether*; *di(propylene)glycol monomethyl ether*, *tri(propylene)glycol monomethyl ether*, *triethylene glycol monomethyl ether*, and mixtures thereof;
- (b) heating the substrate for a sufficient time and at a sufficient temperature in an organic solvent vapor atmosphere to thereby condense the gel composition; and then
- (c) curing the gel composition to form a nanoporous dielectric coating on the substrate. (italics added for emphasis).

Despite the presence of the word "glycol" in the names of the italicized low volatility solvents of claim 1, these compounds are **ethers** which are structurally distinct from any compound that is either disclosed or suggested by the '425 patent. The Examiner has made page 393 of Hawley's Condensed Chemical Dictionary, 12th Edition, hereinafter, "Hawley's") of record in the December 9, 1999 Office Action, to show the physical properties of di(ethylene)glycol monomethyl ether. Hawley's shows that di(ethylene)glycol monomethyl ether has the following chemically distinct structure.



The most fundamental difference is that di(ethylene)glycol monomethyl ether and the other solvents recited by claim 1 are **ethers**, thus placing them into a completely different class of compounds than the **glycols** or simple alcohols of the '425 patent. In addition, the

monomethyl ethers as recited by claim 1 have only a single alcohol functional group, in contrast to the double-alcohol or diol functional groups found in the glycols of the '425 patent. In order to better appreciate the structural differences between di(ethylene)glycol monomethyl ether and the other monomethyl ethers required by claim 1, and the glycol solvents described by the '425 patent, Table 1 is provided.

<u>TABLE 1</u>	
<u>Compound</u>	<u>Formula</u>
di(ethylene)glycol monomethyl ether	
ethylene glycol	
1,4 butylene glycol extra carbon	
1,5 pentanediol	

Other monomethyl ethers as recited by claim 1 are similar to di(ethylene)glycol monomethyl ether, and are set forth in Table 2, below, for convenience.

<u>TABLE 2</u>	
<u>Compound</u>	<u>Formula</u>
tri(ethylene)glycol monomethyl ether	$\text{CH}_3(\text{OCH}_2\text{CH}_2)_3\text{OH}$
tetra(ethylene)glycol monomethyl ether	$\text{CH}_3(\text{OCH}_2\text{CH}_2)_4\text{OH}$
di(propylene)glycol monomethyl ether	$\text{CH}_3(\text{OCH}_2\text{CH}_2\text{CH}_2)_2\text{OH}$
tri(propylene)glycol monomethyl ether	$\text{CH}_3(\text{OCH}_2\text{CH}_2\text{CH}_2)_3\text{OH}$

Thus, in the event that the Examiner takes the position that the rejection under 35 U.S.C. § 102(e) was maintained, it is respectfully urged that the process of the invention, as recited by claim 1 and the claims dependent thereon, is novel over the description of the



'425 patent. Claim 1 requires a very distinct and different solvent, *i.e.*, one or more of the specific monomethyl ether compounds, than is taught by the '425 patent.

**(B). The Pending Claims Are Not Obvious Under 35 U.S.C. § 103(a)**

The Examiner has rejected claims 1-13 and 16-29 as allegedly *prima facie* obvious over the description of U.S. Patent No. 5,736,425, taken together with the general properties, such as boiling point data, of diethylene glycol monomethyl ether as described in "Hawley's". The Examiner has also provided a legal citation, *Sinclair & Carroll Co. v. Interchemical Corporation*, 325 U.S. 327 (1945)<sup>2</sup> in support of his legal analysis.

Applicants respectfully disagree with the Examiner's legal analysis and conclusion. MPEP (v7 Rev. 1) summarizes the law of obviousness, and states, in section 2143, that to successfully maintain an assertion that a claim is *prima facie* obvious,

...three basic criteria must be met. First, there must be some *suggestion or motivation*, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a *reasonable expectation of success*. Finally, the prior art reference (or references when combined) must teach or suggest *all the claim limitations* (Italics added for emphasis).

The same section of the MPEP continues in summarizing the law of obviousness by explaining that,

When the motivation to combine the teachings of the references is not immediately apparent, it is the duty of the examiner to explain why the combination of the teachings is proper. *Ex parte Skinner*, 2 USPQ2d 1788 (Bd. Pat. App. & Inter. 1986).

It is respectfully urged that the Examiner has failed to meet the burden imposed by the law. Neither the '425 patent, the description of diethylene glycol monomethyl ether and its

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<sup>2</sup> This case citation is erroneously stated as 325 U.S. 372 (Office Action dated December 9, 1999, at page 4).

boiling point as set forth in Hawley's Dictionary, nor any other art made of record, provides any suggestion or motivation to substitute the specific required monomethyl ether solvents for glycols or a mixture of glycols and alcohols as taught by the '425 patent.

It is also respectfully urged that the Examiner has misapplied the law to the facts of this case. The Examiner has cited an ancient Supreme Court case, *Sinclair & Carroll Co. v. Interchemical Corporation*, 325 U.S. 327 (1945) for the proposition that, "[r]eading a list and selecting a known compound to meet known requirements is no more ingenious than selecting the last piece to put into the last opening in a jig-saw puzzle. It is not invention." *Sinclair, Id.* at 335.

*Sinclair* is readily distinguished here on the facts. Certainly the present facts are more analogous to those of *United States v. Adams*, 383 U.S. 39 (1966). The Court, in *Adams*, differentiated *Sinclair* by explaining that,

Nor is *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327 (1945), apposite here. . . . The solvent in *Sinclair & Carroll* had no functional relation to the printing ink involved. It served only as an inert carrier. The choice of solvent was dictated by known, required properties. Here, however, the Adams battery is shown to embrace elements having an interdependent functional relationship. *Adams, Id.*, 48-50.

Here, the monomethyl ether solvents are incorporated into a complex composition that must polymerize into a useful dielectric silica film having nanometer scale voids. Given this complexity, it is respectfully submitted that the artisan would have appreciated that boiling points alone would not predict success in selecting one or more solvents for the siloxane precursor composition, and he or she would not have had any suggestions, motivations or guidance from the Examiner's art citations to select these particular monomethyl ethers with any expectation of success.

In addition, the judicial interpretation of the law of obviousness has been refined since the holdings in *Sinclair* and *Adams*. Despite the citation to *Sinclair*, the Examiner's position seems to be based on the now-reinterpreted holding of *In re Durden*, 226 USPQ 359

(Fed. Cir. 1985). In *Durden*, it was held that an old process is "not necessarily" nonobvious solely because the starting material or product is novel and nonobvious.

In the case of *In re Ochiai*, 37 USPQ2d 1127 (Fed. Cir., 1995) the Federal Circuit has made it clear that there is no *per se* rule that substitutions of new element(s) into a known process are *prima facie* obvious. The *Ochiai* court set forth the correct analysis for a process claims as follows.

The test of obviousness . . . requires that one compare the claim's "subject matter as a whole" with the prior art "to which said subject matter pertains." 35 U.S.C. Section 103. The inquiry is thus highly fact-specific by design. This is so "whether the invention be a process for making or a process of using, or some other process." *Kuehl*, 475 F.2d at 665, 177 USPQ at 255. When the references cited by the examiner fail to establish a *prima facie* case of obviousness, the rejection is improper and will be overturned. *In re Fine*, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). [1] (*Italics in original*) *Ochia Id.* at 1131.

In *Ochiai*, the rejected claim described a process for making a cepham compound, using an otherwise old process with a new acylation agent. There, as here, the Examiner took the position that it would have been obvious to replace an element in the known process based on the needed properties. *See also, In re Brouwer* 37 USPQ2d 1663 (Fed. Cir., 1995). In the present case, the Examiner has asserted that the boiling point properties of the recited monomethyl ethers would have rendered their use in the process of claim 1 *prima facie* obvious. Given the endless number of non-glycol solvents available to the artisan to select an alternative solvent for the alkoxysilane composition, the cited art provides absolutely no teaching, suggestion, guidance or motivation to select these *particular* required monomethyl ethers.

The '425 patent only teaches ethylene glycol, they do not teach or suggest the use of a monomethyl ether. The examiner seeks to fill this gap by a showing from Hawley that diethylene glycol monomethyl ether has a boiling point of 194° C. However, the fact that ethylene glycol and diethylene glycol monomethyl ether may have similar boiling points and water miscibility is insufficient to suggest that ethylene glycol may be substituted by

1 diethylene glycol monomethyl ether. They are very different chemical entities which are  
2 not analogs, homologs or isomers of one another and the use of one does not suggest the  
3 use of the other to one skilled in the art.

4 Without accepting the Examiner's position that Applicants' must prove unexpected  
5 advantages in the invention as claimed, it should be appreciated that, in certain situations,  
6 there are advantages that accrue from the use of the monomethyl ether solvents relative to  
7 the previously employed glycols. Monomethyl ether containing compounds have been  
8 found to have better stability in the silica dielectric films resulting from the claimed  
9 processes relative to the solvents of Smith, et al ('425). The Smith et al. glycol solvents  
10 have two or more OH groups which are believed to form an undesired bridging species.  
11 The present invention teaches away from Smith, et al. who advocate (at column 5, lines  
12 35-40) the use of ethylene glycol for exchanging with ethoxy groups on the alkoxysilane.  
13 Such are believed to undesirably crosslink and produce a low storage stability  
14 composition. Boiling point and water miscibility similarities are not sufficient to obviate  
15 the invention. Furthermore, it is submitted that since ethylene glycol and the monomethyl  
16 ethers are not analogs, homologs or isomers of one another, no *prima facie* case of  
17 obviousness has been presented in the first instance requiring rebuttal evidence

18 However, assuming *arguendo* that there are advantages, as outlined above, for the use of  
19 the monomethyl ether solvents, there is no legal requirement that the claimed invention be  
20 shown to be advantageous absent a *prima facie* assertion that the claimed process would  
21 have been obvious. Based on a correct legal analysis, applicants should not be put to the  
22 trouble and expense of assuming the burden of proving any advantages related to the  
23 inclusion of the monomethyl ether solvents.

In addition, the Examiner has made the unsupported statement that a "combined stream"  
step in the process recited by pending claims 10-12 is obvious, without establishing any  
basis for this on the record. Applicants' Response to Office Action, dated February 24,  
2000, made after Final, requested at page 3 that the Examiner make such evidence of

record, in the form of a reference or his own affidavit or declaration of personal knowledge. The Examiner has not been forthcoming with such evidentiary support.

**(C). The Judiciously Created Doctrine Of Obviousness-Type  
Double Patenting is Inapplicable to the Pending Claims**

The Examiner provisionally rejected claims 1-13 and 16-29 under the judiciously created doctrine of obviousness-type double patenting as being unpatentable over claims 1-53 of the '425 patent or claims 1-39 of the '607 patent, with either being taken in view of the Hawley reference. For all of the reasons given above against the application of the combination of the '425 patent and Hawley against the pending claims, it is respectfully urged that none of the cited references, taken individually or in any combination would have provided the artisan with any teaching, suggestion or motivation to make the invention as presently claimed.

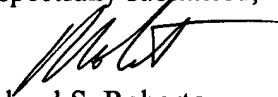
To be sure, some of the individual steps within the instant sequence of steps have been used before in the art with other solvents. In addition, certain combinations of some of the individual steps have also been known before employing other solvents. Broad categories of techniques of preparing nanoporous silica dielectric films are all known. However, the step of adding the monomethyl ethers to the siloxane composition has not been heretofore known and are certainly not stated in the claims of either the '425 neither patent nor the '607 patent.

It is submitted that this ground of rejection is legally impermissible. Neither the '425 patent nor the '607 patent claim a method wherein the alkoxysilane composition contain a monomethyl ether. The claims of the '425 patent require a solvent which is ethylene glycol, 1,4-butylene glycol or 1,5-pentanediol. U.S. 5,807,607 requires a solvent which is a polyol, specifically glycerol. These are not monomethyl ethers and such polyols and monomethyl ethers are not analogs, homologs nor isomers and are therefore not suggestive of one another. In view of the fact that the claims of this application are

mutually exclusive from those of the '425 and '607 patents, it is submitted that this ground of rejection should be overruled.

None of the cited references, taken alone or in combination, teaches or suggests the invention claimed by Applicants. For all the above reasons, claims 1-13 and 16-29 are urged to be patentable over the cited references, and all the rejections should be overruled.

Respectfully submitted,



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I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail, postage pre-paid in an envelope addressed to Assistant Commissioner for Patents and Trademarks, Washington, D.C. 20231, on June 15, 2000.



Richard S. Roberts

## IX. APPENDIX

1. A process for forming a nanoporous dielectric coating on a substrate which comprises:
  - (a) forming a substantially uniform alkoxysilane gel composition on a surface of a substrate, which alkoxysilane gel composition comprises a combination of at least one alkoxysilane, an organic solvent composition, water, and an optional base catalyst; wherein the organic solvent composition comprises a relatively high volatility solvent having a boiling point of about 120 °C or less, and a relatively low volatility solvent selected from the group consisting of di(ethylene)glycol monomethyl ether, tri(ethylene)glycol monomethyl ether, tetra(ethylene)glycol monomethyl ether; di(propylene)glycol monomethyl ether, tri(propylene)glycol monomethyl ether, triethylene glycol monomethyl ether, and mixtures thereof;
  - (b) heating the substrate for a sufficient time and at a sufficient temperature in an organic solvent vapor atmosphere to thereby condense the gel composition; and then
  - (c) curing the gel composition to form a nanoporous dielectric coating on the substrate.
2. The process of claim 1 wherein the organic solvent vapor atmosphere contains a relatively low volatility organic solvent which has a boiling point of about 175°C or higher.
3. The process of claim 2 wherein the organic solvent vapor atmosphere contains a relatively low volatility organic solvent is selected from the group consisting of di(ethylene)glycol monomethyl ether, tri(ethylene)glycol monomethyl ether, tetra(ethylene)glycol monomethyl ether; di(propylene)glycol monomethyl ether, tri(propylene)glycol monomethyl ether, ethylene glycol, 1,4-butylene glycol, 1,5-pentanediol, 1,2,4-butanetriol, 1,2,3-butanetriol, 2-methyl-propanetriol, 2-(hydroxymethyl)-1,3-propanediol, 1,4-butanediol, 2-methyl-1,3-propanediol, tetraethylene glycol, triethylene glycol monomethyl ether, glycerol, di(ethylene)glycol, tri(ethylene)glycol, tetra(ethylene)glycol, penta(ethylene)glycol, di(propylene)glycol, hexa(ethylene)glycol and mixtures thereof.

4. The process of claim 1 wherein the organic solvent composition of step (a) comprises the same organic solvent as in the organic solvent vapor atmosphere of step (b).
5. The process of claim 1 wherein the solvent vapor atmosphere contains a relatively low volatility organic solvent which is present in the atmosphere in an amount of from about 50 to about 99.9 percent saturation.
6. The process of claim 1 wherein the optional base catalyst is present in the alkoxysilane gel composition.
7. The process of claim 1 wherein the alkoxysilane gel composition is formed by exposing the alkoxysilane to the water in the form of water vapor.
8. The process of claim 1 wherein the alkoxysilane gel composition is formed by exposing the alkoxysilane to the base catalyst in the form of base vapor.
9. The process of claim 1 wherein the alkoxysilane gel composition is formed by exposing the alkoxysilane both to water in the form of water vapor and to the base catalyst in the form of base vapor.
10. The process of claim 1 wherein the alkoxysilane gel composition is formed by depositing the alkoxysilane and the organic solvent composition onto the substrate in the form of a stream.
11. The process of claim 1 wherein the alkoxysilane gel composition is formed by depositing the alkoxysilane, the organic solvent composition, and the water onto the substrate in the form of a combined stream.



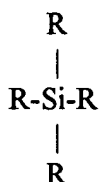
12. The process of claim 1 wherein the alkoxysilane gel composition is formed by depositing the alkoxysilane, the organic solvent composition, and the base catalyst onto the substrate in the form of a combined stream.

13. The process of claim 1 wherein the alkoxysilane gel composition is formed by depositing the alkoxysilane, the organic solvent composition, the water, and the base catalyst onto the substrate in the form of a combined stream.

16. The process of claim 14 wherein the relatively high volatility solvent comprises one or more components selected from the group consisting of methanol, ethanol, n-propanol, isopropanol, n-butanol and mixtures thereof and wherein the relatively low volatility solvent composition comprises an alcohol or a polyol.

17. The process of claim 1 wherein the base catalyst is selected from the group consisting of ammonia, primary alkyl amines, secondary alkyl amines, tertiary alkyl amines, aryl amines, alcohol amines and mixtures thereof.

18. The process of claim 1 wherein the alkoxysilane has the formula:



wherein at least 2 of the R groups are independently C<sub>1</sub> to C<sub>4</sub> alkoxy groups and the balance, if any, are independently selected from the group consisting of hydrogen, alkyl, phenyl, halogen, substituted phenyl.

19. The process of claim 18 wherein each R is methoxy, ethoxy or propoxy.

20. The process of claim 1 wherein the alkoxysilane composition comprises at least one organic solvent selected from the group consisting of methanol, ethanol, n-propanol, isopropanol, n-butanol, ethylene glycol, 1,4-butylene glycol, 1,5-pentanediol, 1,2,4-butanetriol, 1,2,3-butanetriol, 2-methyl-propanetriol, 2-(hydroxymethyl)-1,3-propanediol, 1,4,1,4-butanediol, 2-methyl-1,3-propanediol, tetraethylene glycol, triethylene glycol monomethyl ether, glycerol, and mixtures thereof.
21. The process of claim 1 wherein the substrate comprises silicon or gallium arsenide.
22. The process of claim 1 wherein the substrate comprises at least one semiconductor material.
23. The process of claim 21 wherein the semiconductor material is selected from the group consisting of gallium arsenide, silicon, and compositions containing silicon such as crystalline silicon, polysilicon, amorphous silicon, epitaxial silicon, and silicon dioxide, and mixtures thereof.
24. The process of claim 1 wherein the substrate has a pattern of lines on its surface.
25. The process of claim 24 wherein the lines comprise a metal, an oxide, a nitride or an oxynitride.
26. The process of claim 1 wherein the gel composition is cured by heating.
27. The process of claim 1 wherein the nanoporous dielectric coating has a dielectric constant of from about 1.1 to about 3.5.
28. The process of claim 1 further comprising the step, after step (b) and either before or after step (c), of treating the nanoporous dielectric coating with a surface modification agent under conditions sufficient to render the nanoporous dielectric coating hydrophobic.

29. The process of claim 28 wherein the surface modification agent comprises hexamethyldisilazane.

## **In re Oetiker**

# **U.S. Court of Appeals Federal Circuit 24 USPQ2d 1443**

**Decided October 13, 1992**

**No. 91-1026 Headnotes**

### **PATENTS**

**1. Practice and procedure in Patent and Trademark Office -- Prosecution -- In general (§ 110.0901)**

**Patentability/Validity -- Obviousness -- In general (§ 115.0901)** "Prima facie" case is procedural tool of patent examination which allocates burdens of going forward as between examiner and applicant; examiner bears initial burden, on review of prior art or on any other ground, of presenting prima facie case of unpatentability, and if that burden is met, burden of coming forward with evidence or argument shifts to applicant, and after applicant submits such evidence in response, patentability is determined on totality of record, by preponderance of evidence with due consideration to persuasiveness of argument.

**2. Practice and procedure in Patent and Trademark Office -- Board of Patent Appeals and Interferences -- In general (§ 110.1101)** Board of Patent Appeals and Interferences, in reviewing examiner's decision on appeal, must necessarily weigh all evidence and argument, and board's observation that examiner made prima facie case of unpatentability is not improper, as long as ultimate determination of patentability is made on entire record.

**3. Practice and procedure in Patent and Trademark Office -- Prosecution -- In general (§ 110.0901)**

**Patentability/Validity -- Obviousness -- In general (§ 115.0901)** Concept of "prima facie" case of obviousness, which places initial burden on examiner, is of broad applicability and is not limited to chemical practice; that prima facie case may be established, or rebutted, by different forms of evidence in various technologies does not restrict concept to any particular field of technology.

**4. Patentability/Validity -- Obviousness -- Relevant prior art -- In general (§ 115.0903.01)**

**Patentability/Validity -- Obviousness -- Combining references** (§ 115.0905) Prior art reference, in order to be relied upon as basis for rejecting applicant's invention, must either be in field of applicant's endeavor or, if not, be reasonably pertinent to particular problem with which inventor was concerned; combination of elements from non-analogous sources, in manner that reconstructs applicant's invention only with benefit of hindsight, is insufficient to present prima facie case of obviousness.

**5. Patentability/Validity -- Obviousness -- In general** (§ 115.0901) Simplicity of invention is not itself inimical to patentability. **Case History and Disposition:**

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Appeal from the U.S. Patent and Trademark Office, Board of Patent Appeals and Interferences. Application for patent, no. 06/942,694, filed by Hans Oetiker. From decision holding claims unpatentable, applicant appeals. Reversed; Nies, C.J., and Plager, J., concurring in separate opinions.

**Attorneys:**

Paul M. Craig, Jr., Washington, D.C., for appellant. John W. Dewhirst (Fred E. McKelvey, solicitor and Robert D. Edmonds, associate solicitor, with him on brief), for appellee.

**Judge:**

Before Nies, chief judge, and Newman and Plager, circuit judges. **Opinion Text**  
**Opinion By:**

Newman, J. Hans Oetiker appeals the decision of the United States Patent and Trademark Office Board of Patent Appeals and Interferences, holding unpatentable claims 1-14 and 6-21, all of the claims in patent application No. 06/942,694. 1 Oetiker appeals on procedural and substantive grounds. **I PROCEDURE Background** All of the claims were finally rejected for obviousness in terms of 35 U.S.C. Section 103. The

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Board, upholding the rejection, stated that "the examiner has . . . established a *prima facie* case of obviousness . . . which is unrebutted by any objective evidence of nonobviousness". Oetiker stated that this Board holding was the first rejection of his claims for being "*prima facie* obvious", and filed rebuttal evidence with a petition for reconsideration. The Board declined to consider the new evidence or change its decision. Oetiker states that a holding of *prima facie* obviousness means, in patent examination, that the claimed invention is subject to a rebuttable presumption of obviousness; that is, if the applicant can provide evidence or argument in support of unobviousness, such evidence and argument will be considered, and the question of patentability will be redecided on the entire record. Oetiker states that a rejection made in the words "*prima facie* obvious" is understood by patent examiners and practitioners as an invitation to

provide such rebuttal evidence. Thus Oetiker argues that a holding by the Board of *prima facie* obviousness is a new ground of rejection, for during prosecution the examiner did not reject the claims in these words. Treating it as such, Oetiker offered affidavit evidence not previously filed, and requested reconsideration on the basis of this new evidence, or remand to the examiner for this purpose, in accordance with 37 C.F.R. Section 1.196(b):

Section 1.196(b) . . . When the Board . . . makes a new rejection of an appealed claim, the appellant may exercise either of the following two options . . . :

(1) The appellant may submit . . . a showing of facts . . . and have the matter reconsidered by the examiner in which event the application will be remanded to the examiner. . . . (2) The appellant may have the case reconsidered under Section 1.197(b) by the Board . . . upon the same record. The Board on reconsideration granted neither of the options of Section 1.196(b), stating that it had not made a new rejection. At argument before this court the Commissioner's counsel suggested that Oetiker could refile his patent application, pay a new fee, and obtain review of this new evidence in a new examination. Oetiker states that he was entitled to a complete examination, and did not get it. *Discussion*[1] The *prima facie* case is a procedural tool of patent examination, allocating the burdens of going forward as between examiner and applicant. *In re Spada*, 911 F.2d 705, 707 n.3, 15 USPQ2d 1655, 1657 n.3 (Fed. Cir. 1990). The term "*prima facie* case" refers only to the initial examination step. *In re Piasecki*, 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed. Cir. 1984); *In re Rinehart*, 531 F.2d 1048, 1052, 189 USPQ 143, 147 (CCPA 1976). As discussed in *In re Piasecki*, the examiner bears the initial burden, on review of the prior art or on any other ground, of presenting a *prima facie* case of unpatentability. If that burden is met, the burden of coming forward with evidence or argument shifts to the applicant. After evidence or argument is submitted by the applicant in response, patentability is determined on the totality of the record, by a preponderance of evidence with due consideration to persuasiveness of argument. See *In re Spada, supra*; *In re Corkill*, 771 F.2d 1496, 1500, 226 USPQ 1005, 1008 (Fed. Cir. 1985); *In re Caveny*, 761 F.2d 671, 674, 226 USPQ 1, 3 (Fed. Cir. 1985); *In re Johnson*, 747 F.2d 1456, 1460, 223 USPQ 1260, 1263 (Fed. Cir. 1984). If examination at the initial stage does not produce a *prima facie* case of unpatentability, then without more the applicant is entitled to grant of the patent. See *In re Grabiak*, 769 F.2d 729, 733, 226 USPQ 870, 873 (Fed. Cir. 1985); *In re Rinehart, supra*. [2] In reviewing the examiner's decision on appeal, the Board must necessarily weigh all of the evidence and argument. An observation by the Board that the examiner made a *prima facie* case is not improper, as long as the ultimate determination of patentability is made on the entire record. *In re Piasecki*, 745 F.2d at 1472, 223 USPQ at 788; *In re Rinehart*, 531 F.2d at 1052, 189 USPQ at 147. The record here reveals that the application was fully prosecuted. References were cited and applied by the examiner, the applicant responded with argument, and the examiner then issued a final rejection, stating why he was not persuaded by the applicant's argument. On review the Board stated that its decision was reached "after careful consideration of the appealed claims, the evidence of obviousness relied upon by the examiner and the arguments advanced by the appellant and the examiner". The Board explained why it was unpersuaded by Oetiker's arguments

on appeal. We discern no irregularity in the procedure. The Board, in explaining that the examiner's rejections constituted a *prima facie* case of obviousness, did not make a new rejection. [3] Oetiker also argues that the concept of a "*prima facie* case of obviousness" has no role outside of the chemical arts. Oetiker

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refers to the origins of this term in the chemical practice, where properties may not be apparent from chemical structure. Oetiker distinguishes mechanical inventions, where  
10 the properties and workings of a mechanical device are apparent in the drawing of the structure. We think that the PTO is correct in treating the concept of the *prima facie* case as of broad applicability, for it places the initial burden on the examiner, the appropriate procedure whatever the technological class of invention. That a *prima facie* case may be established, or rebutted, by different forms of evidence in various  
15 technologies does not restrict the concept to any particular field of technology. "[T]he requirement of unobviousness in the case of chemical inventions is the same as for other types of inventions". *In re Johnson*, 747 F.2d at 1460, 223 USPQ at 1263. This procedural tool is recognized in fields outside of the chemical arts. *E.g., In re Benno*, 768 F.2d 1340, 226 USPQ 683 (Fed. Cir. 1985); *In re McCarthy*, 763 F.2d 411, 226  
20 USPQ 99 (Fed. Cir. 1985); *In re De Blauwe*, 736 F.2d 699, 222 USPQ 191 (Fed. Cir. 1984). The Board's usage of the term *prima facie* was imprecise for, as discussed *supra*, the term "*prima facie* obvious" relates to the burden on the examiner at the initial stage of the examination, while the conclusion of obviousness *vel non* is based on the preponderance of evidence and argument in the record. However, it was clear that the  
25 Board did not make a new rejection. Therefore the Board did not err in declining to consider at that stage the proffered evidence of commercial success.

## II THE MERITS

30 Oetiker's invention is an improvement in a "stepless, earless" metal clamp, a hose clamp that was generally described in an earlier '004 patent of Oetiker, but that differs in the presence of a feature that is described as a preassembly "hook". This "hook" serves both to maintain the preassembly condition of the clamp and to be disengaged automatically when the clamp is tightened. The cited references were Oetiker's earlier-granted '004  
35 patent, combined with a certain Lauro '400 patent. Lauro describes a plastic hook and eye fastener for use in garments, in which "unitary tabs of sewing needle puncturable plastic material . . . are affixable to clothing and the like by sewing". Oetiker argues that there is no suggestion or motivation to the artisan to combine the teachings of the cited references, and that Lauro is nonanalogous art. Oetiker concludes that these references  
40 were improperly combined; that a person of ordinary skill, seeking to solve the problem facing Oetiker, would not look to the garment art for the solution. Oetiker also argues that even if combined the references do not render the claimed combination obvious. The examiner stated that "since garments commonly use hooks for securement", a person faced with the problem of unreliable maintenance of the pre-assembly configuration of  
45 an assembly line metal hose clamp would look to the garment industry art. The examiner explained further by stating that "Appellant's device as disclosed could be utilized as part

of a garment". The Board did not repeat or support the examiner's argument, or discuss its relevance. Indeed, the argument is not supportable. However, the Board held that the Lauro reference, although not "within the appellant's specific field of endeavor" is nonetheless "analogous art" because it relates to a hooking problem, as does Oetiker's invention. The Board apparently reasoned that all hooking problems are analogous. At least, that is the argument now pressed by the Commissioner. The Commissioner states in his brief on appeal that "A disengageable catch, such as that used by Oetiker, is a common everyday mechanical concept that is variously employed in door latches and electrical and other switches, as well as in the hook and eye apparatus disclosed by Lauro". No such references were cited, however. While this court may take judicial notice of common everyday mechanical concepts in appropriate circumstances, the Commissioner did not explain why a "catch" of unstated structure in an electrical switch, for example, is such a concept and would have made Oetiker's invention obvious. Indeed, the Commissioner did not respond to Oetiker's argument that the cited references provide no teaching or suggestion that Lauro's molded hook and eye fastener, even if combined with Oetiker's '004 clamp, would achieve Oetiker's purpose. [4] In order to rely on a reference as a basis for rejection of the applicant's invention, the reference must either be in the field of the applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned. See *In re Deminski*, 796 F.2d 436, 442, 230 USPQ 313, 315 (Fed. Cir. 1986). Patent examination is necessarily conducted by hindsight, with complete knowledge of the applicant's invention, and the courts have recognized the subjective aspects of determining whether an inventor would reasonably

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be motivated to go to the field in which the examiner found the reference, in order to solve the problem confronting the inventor. We have reminded ourselves and the PTO that it is necessary to consider "the reality of the circumstances", *In re Wood*, 599 F.2d 1032, 1036, 202 USPQ 171, 174 (CCPA 1979) -- in other words, common sense -- in deciding in which fields a person of ordinary skill would reasonably be expected to look for a solution to the problem facing the inventor. It has not been shown that a person of ordinary skill, seeking to solve a problem of fastening a hose clamp, would reasonably be expected or motivated to look to fasteners for garments. The combination of elements from non-analogous sources, in a manner that reconstructs the applicant's invention only with the benefit of hindsight, is insufficient to present a *prima facie* case of obviousness. There must be some reason, suggestion, or motivation found in the prior art whereby a person of ordinary skill in the field of the invention would make the combination. That knowledge can not come from the applicant's invention itself. *Diversitech Corp. v. Century Steps, Inc.*, 850 F.2d 675, 678-79, 7 USPQ2d 1315, 1318 (Fed. Cir. 1988); *In re Geiger*, 815 F.2d 686, 687, 2 USPQ2d 1276, 1278 (Fed. Cir. 1987); *Interconnect Planning Corp. v. Feil*, 774 F.2d 1132, 1147, 227 USPQ 543, 551 (Fed. Cir. 1985). [5] Oetiker's invention is simple. Simplicity is not inimical to patentability. See *Goodyear Tire & Rubber Co. v. Ray-O-Vac Co.*, 321 U.S. 275, 279, 60 USPQ 386, 388 (1944) (simplicity of itself does not negative invention); *Panduit Corp. v. Dennison Mfg Co.*, 810 F.2d 1561, 1572, 1 USPQ2d 1593, 1600 (Fed. Cir.) (the patent system is not



foreclosed to those who make simple inventions), *cert. denied*, 481 U.S. 1052 (1987). We conclude that the references on which the Board relied were improperly combined. Accordingly, the Board erred in holding the claims unpatentable under section 103. The rejection of claims 1-4 and 16-21 is *REVERSED*.

## Footnotes

Footnote 1. *Ex parte Oetiker*, No. 89-2230 (Bd. Pat App. & Interf. May 31, 1990; on reconsideration, August 23, 1990).

## Concurring Opinion Text

### Concur By:

Nies, C.J., concurring.

I agree with the panel decision and write only to express my understanding of the language that there must be some teaching, reason, suggestion, or motivation found "in the prior art" or "in the prior art references" to make a combination to render an invention obvious within the meaning of 35 U.S.C. Section 103 (1988). Similar language appears in a number of opinions and if taken literally would mean that an invention cannot be held to have been obvious unless something specific in a prior art reference would lead an inventor to combine the teachings therein with another piece of prior art. This restrictive understanding of the concept of obviousness is clearly wrong. Other statements in opinions express the idea more generally. We have stated, for example, that the test is: "whether the teachings of the prior art, taken as a whole, would have made obvious the claimed invention," *In re Gorman*, 933 F.2d at 986, 18 USPQ2d at 1888, and "what the combined teachings . . . would have suggested to one of ordinary skill in the art," *In re Young*, 927 F.2d 588, 591, 18 USPQ2d 1089, 1091 (Fed. Cir. 1991). We have also stated that "the prior art as a whole must suggest the desirability . . . of making the combination." *Uniroyal, Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 1051, 5 USPQ2d 1434, 1438 (Fed. Cir.), *cert. denied*, 488 U.S. 825 (1988); *Lindemann Maschinenfabrik GMBH v. American Hoist & Derrick Co.*, 730 F.2d 1452, 1462, 221 USPQ 481, 488 (Fed. Cir. 1984). I believe that it would better reflect the concept of obviousness to speak in terms of "*from* the prior art" rather than simply "*in* the prior art." The word "*from*" expresses the idea of the statute that we must look at the obviousness issue through the eyes of one of ordinary skill in the art and what one would be presumed to know with that background. What would be obvious to one of skill in the art is a different question from what would be obvious to a layman. An artisan is likely to extract more than a layman from reading a reference. In any event, variance in the language used in opinions does not change the nature of the statutory inquiry. Under section 103, subject matter is unpatentable if it "would have been obvious . . . to a person having

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ordinary skill in the art." While there must be some teaching, reason, suggestion, or motivation to combine existing elements to produce the claimed device, it is not necessary that the cited references or prior art specifically suggest making the combination. *In re Nilssen*, 851 F.2d 1401, 1403, 7 USPQ2d 1500, 1502 (Fed. Cir.

1988). Such suggestion or motivation to combine prior art teachings can derive solely from the existence of a teaching, which one of ordinary skill in the art would be presumed to know, and the use of that teaching to solve the same of similar problem which it addresses. *In re Wood*, 599 F.2d 1032, 1037, 202 USPQ 171, 174 (CCPA 1979). See, also, *EWP Corp. v. Reliance Universal, Inc.*, 755 F.2d 898, 906-07, 225 USPQ 20, 25 (Fed. Cir.), cert. denied, 474 U.S. 843 (1985); *In re Sernaker*, 702 F.2d 989, 995, 217 USPQ 1, 6 (Fed. Cir. 1983). See also, *Ex parte Clapp*, 227 USPQ 972, 973 (Bd. Pat. App. & Inter. 1985) ("To support the conclusion that the claimed combination is directed to obvious subject matter, either the references must expressly or implicitly suggest the claimed combination or the examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references."). In sum, it is off the mark for litigants to argue, as many do, that an invention cannot be held to have been obvious unless a suggestion to combine prior art teachings is found in a specific reference.

#### Footnotes

Footnote 1. See, e.g., *Symbol Technologies, Inc. v. Opticon, Inc.*, 935 F.2d 1569, 19 USPQ2d 1241, 1246 (Fed. Cir. 1991); *In re Gorman*, 933 F.2d 982, 989, 18 USPQ2d 1885, (Fed. Cir. 1991); *In re Mills*, 916 F.2d 680, 682, 16 USPQ2d 1430, (Fed. Cir. 1990); *Smithkline Diagnostics, Inc. v. Helena Laboratories Corp.*, 859 F.2d 878, 887, 8 USPQ2d 1468, 1475 (Fed. Cir. 1988); *In re Dow Chemical Co.*, 837 F.2d 469, 473, 5 USPQ2d 1529, 1531 (Fed. Cir. 1988); *In re Stencel*, 828 F.2d 751, 755, 4 USPQ2d 1071, 1073 (Fed. Cir. 1987); *Ashland Oil, Inc. v. Delta Resins & Refractories, Inc.*, 776 F.2d 281, 293, 227 USPQ 657, 664 (Fed. Cir. 1985), cert. denied, 475 U.S. 1017 (1986); *In re Grabiak*, 769 F.2d 729, 732, 226 USPQ 870, 872 (Fed. Cir. 1985).

#### Concurring Opinion Text

##### Concur By:

Plager, J., concurring.

I join in the carefully-reasoned and well-written opinion of Judge Newman. With regard to Part I dealing with the PTO procedure, her explanation of the meaning and application of the 'prima facie case' concept should help clarify an area that remains marked by a lack of clarity. The need for that discussion, however, illustrates the pitfalls of the 'prima facie' practice of the PTO, and the difficulties created by this particular legalistically convoluted concept. An applicant for a patent is entitled to the patent unless the application fails to meet the requirements established by law. It is the Commissioner's duty (acting through the examining officials) to determine that all requirements of the Patent Act are met. The burden is on the Commissioner to establish that the applicant is not entitled under the law to a patent. *In re Warner*, 379 F.2d 1011, 1016, 154 USPQ 173, 177 (CCPA 1967), cert. denied, 389 U.S. 1057 (1968). In rejecting an application, factual determinations by the PTO must be based on a preponderance of the evidence, and legal conclusions must be correct. *In re Caveney*, 761 F.2d 671, 674, 226 USPQ 1, 3

(Fed. Cir. 1985). The process of patent examination is an interactive one. *See generally*, Chisum, *Patents*, Section 11.03 *et seq.* (1992). The examiner cannot sit mum, leaving the applicant to shoot arrows into the dark hoping to somehow hit a secret objection harbored by the examiner. The 'prima facie case' notion, the exact origin of which appears obscure ( *see In re Piasecki*, 745 F.2d 1468, 1472, 233 USPQ 785, 788 (Fed. Cir. 1984)), seemingly was intended to leave no doubt among examiners that they must state clearly and specifically any objections (the prima facie case) to patentability, and give the applicant fair opportunity to meet those objections with evidence and argument. To that extent the concept serves to level the playing field and reduces the likelihood of administrative arbitrariness. But the ultimate decision that must be made by the PTO in the examination process, and by this court on appeal, is not whether a prima facie case for rejection was made; the only question is whether, on the whole record, the applicant has met the statutory requirements for obtaining a patent. When a final rejection is described in terms of whether a prima facie case was made, that intermediate issue diverts attention from what should be the question to be decided. Specifically, when obviousness is at issue, the examiner has the burden of persuasion and therefore the initial burden of production. Satisfying the burden of production, and thus initially the burden of persuasion, constitutes the so-called prima facie showing. Once that burden is met, the applicant has the burden of production to demonstrate that the examiner's preliminary determination is not correct. The examiner, and if later involved, the Board, retain the ultimate burden of persuasion on the issue. If, as a matter of law, the issue is in equipoise, the applicant is entitled to the patent. Thus on appeal to this court as in the PTO, the applicant does not bear the ultimate burden of persuasion on the issue. In the end there is no reason there or here to argue over whether a 'prima facie' case was made out. The only determinative issue is whether the record as a whole supports the legal conclusion that the invention would have been obvious.

30 - End of Case -

## Ex parte Natale

# U.S. Patent and Trademark Office, Board of Patent Appeals and Interferences 11 USPQ2d 1222

Decided March 31, 1989

No. 88-4263 Headnotes

### PATENTS

**1. Practice and procedure in U.S. Patent and Trademark Office -- Re-examination -**  
**- Prior art considered** (§ 110.1505) Board of Patent Appeals and Interferences' decision in *Ex parte McGaughey*, 6 USPQ2d 1334, is confined to whether prior art, as established in patent record by unequivocal admission, may be relied upon to support rejection during re-examination proceeding involving that patent, and question of whether such holding should be extended, by expanding scope of re-examination proceedings to permit reliance upon prior art established by admissions during re-examination proceeding or during external court proceedings need not be determined in present proceeding, since no prior art has been found to have been established by admission in present re-examination proceeding or in any external court proceeding.

**2. Practice and procedure in U.S. Patent and Trademark Office -- Re-examination -**  
**- Prior art considered** (§ 110.1505)

**Patentability/Validity -- Anticipation -- Prior public use or sale** (§ 115.0706) Patent examiner has no authority to engage in fact-finding endeavor to establish existence of public use under 35 USC 102(b) during re-examination proceeding.

**3. Practice and procedure in U.S. Patent and Trademark Office -- Re-examination -**  
**- Prior art considered** (§ 110.0505)

**Patentability/Validity -- Anticipation -- Prior publication** (§ 115.0705) Document relied upon as printed publication must have traversed into public domain and been accessible to public, and burden of establishing that document was publicly accessible rests upon patent examiner as part of examiner's burden of establishing prima facie basis for denying patentability.

**4. Practice and procedure in U.S. Patent and Trademark Office -- Re-examination -**  
**- In general** (§ 110.1501) Patent examiner's failure to provide objective evidence to support challenged officially-noticed fact constitutes clear and reversible error.

**Particular patents -- Chemical -- Particulate control and filtering** 4,604,111, Natale,

method for particulate contamination control and filtration device for reducing airborne asbestos contamination during asbestos removal from building, rejection of claims 1-29 in re-examination proceeding reversed. **Case History and Disposition:**

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Appeal from rejection of claims (Tim Miles, primary examiner).

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Request, control no. 90/001,227, filed May 20, 1985, for re-examination of patent no. 4,604,111, issued Aug. 5, 1986, based on application, serial no. 735,716, filed April 20, 1985; and a continuation of serial no. 323,730, filed Nov. 23, 1981, abandoned. On appeal from final rejection of claims. Reversed.

**Attorneys:**

Harvey B. Jacobson and Fleit, Jacobson, Cohn & Price, Washington, D.C., for appellant.

**Judge:**

Before Serota, chairman, and Steiner and W. Smith, examiners-in-chief. **Opinion**

**TextOpinion By:**

Steiner, examiner-in-chief. This is an appeal from the final rejection of claims 1 through 29, which are all of the claims in this reexamination proceeding involving U.S. Patent No. 4,604,111. Claims 1 through 17 are identical to the claims appearing in the patent; claims 18 through 29 were added during prosecution of this reexamination. The subject matter on appeal is directed to a method and system for reducing airborne asbestos contamination during the course of asbestos removal from an existing building. Claims 1 and 24 are illustrative and read as follows: 1. A method of establishing a negative pressure environment within an existing building for removing dangerous solid materials from the building, said method comprising: (1) defining an enclosed space within said building using existing wall structure to define at least a portion of said enclosed space; (2) establishing at least one flow path for air to enter said enclosed space; (3) continuously evacuating air from said enclosed space through a filter means to remove dangerous solid materials from said evacuated air and to establish a negative air pressure in said enclosed space so that air exiting said space passes through said filter means; and (4) sealing said flow path against air exiting from said air space to the exterior of said enclosed space in the event of loss of negative air pressure in said enclosed space. 24. A system for establishing a favorable environment for removing dangerous solid asbestos materials from an existing building, said system comprising: wall means enclosing a defined air space containing asbestos contamination within said building, said air space also containing airborne asbestos fibers, said wall means including at least one inlet for outside air to enter said air space and an outlet for air filtered by a filter means to exit from said air space; filter means for filtering air in said air space; high volume air moving means for producing a negative air pressure within said air space and for drawing large volumes of outside air into said air space through said inlet and for moving the large

volumes of air through said filter means in advance of moving air through said outlet, thereby reducing the level of airborne asbestos fibers in said air space; and sealing means for sealing off said inlet against air exiting from said air space to the exterior of said air space automatically upon loss of negative air pressure in said air space. The evidentiary materials relied upon by the examiner in support of his rejections of the appealed claims are: A. Patent Owners Statement, paper No. 10, filed herein Oct. 5, 1987, especially pages 11-13; B. Affidavit of Thomas Natale, filed herein March 7, 1988 as attachment to paper No. 24, especially paragraphs 16 and 29; C. Supplemental Affidavit of Anthony Natale, filed herein April 29, 1988 as attachment to paper No. 36, especially paragraph 4; D. Affidavit of Norman M. Cohn, filed herein March 14, 1988 as attachment to paper No. 29, especially paragraphs 4, 5, 7, 15-19, 22 and 23; E. Affidavit of Joseph E. Wilson, filed herein March 14, 1988 as attachment to paper No. 29, especially paragraphs 5, 7 and 16-24; F. "Asbestos" book, Vol. 1, pages 279-305, 1979, John Wiley & Sons, Ltd. (attachment KS to paper No. 9); G. "Micro-Trap," published by Asbestos Control Technology, Inc., Maple Shade, N.J. (attachment Q to paper No. 9, pages 13A and 13C-13E); H. "Environmental Consulting and Testing Services" report of Evaluation of Asbestos Removal at . . . Cinnaminson, N.J., August 26, 1980, Suite 110, Cherry Hill, N.J., pages 1-12 (attachment O to paper No. 9); I. Brand Mid-Atlantic, Inc. v. Natale et al., U.S. District Court for the Eastern District of Pennsylvania, Civil Action 86-7093, Defendants' Answers and Objections to Plaintiff's First Set of Interrogatories, Interrogatory and Response No. 22 (attachment D to paper No. 9);

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J. Blueprint, First Floor Plan of U.S. Post Office at Greensboro, N.C., sheet 4 of 7, Bid Invitation No. 129952-80-A-0037, George M. Smart, Architects, Inc., Raleigh, N.C. (Requestor's Document No. 12); and K. Whitfield 3,158,457 Nov. 24, 1964 The following rejections appear in the Examiner's Answer: 1. claims 1 through 11 and 13 through 29 stand rejected under 35 U.S.C. 102a, or 102b, and 103 as unpatentable over the Environmental Consulting and Testing Services (ECTS) report 200309-A, dated August 26, 1980 (reference H as listed above) in combination with the public use which occurred at Cinnaminson, N.J. and/or at Morrestown, N.J., (MPEP section 2217) as established at various places on the record as noted herein (see above listing and description of prior art), for example by the Patent Owner's admissions on pages 11-13 of his statement filed October 5, 1987 (reference A as listed above), and by the admissions in response 22 of reference I as listed above, especially as further amplified by the affidavits of Norman M. Cohn (reference D) and Joseph D. Wilson (reference E) filed Mar. 14, 1988 by the patent owner (MPEP sections 2216 or 2258). Further, any or all of the MICRO-TRAP filter publication (reference G), the "Asbestos" book publication (reference F) or the blueprint listed above may be relied on in combination with this rejection in ways to be stated below (page 10 of the Answer); 1 2. claim 12 stands rejected for the reasons set forth in rejection 1 above, further in view of Whitfield; 3. claims 1 through 11 and 13 through 15 stand rejected under 35 U.S.C. 102(b) as anticipated by or, alternatively, under 35 U.S.C. 103 as unpatentable over "Asbestos"; 4. claims 1 through 11 and 13 through 29 stand rejected under 35 U.S.C. 103 as

unpatentable over "Asbestos" in view of the prior public use that occurred at Cinnaminson or Morrestown, N.J. prior to October 23, 1980; and 5. claim 12 stands rejected for the reasons set forth in either rejection 3 or 4 above, further in view of Whitfield. We reverse each of the examiner's rejections. **Rejection 1** The rejection of claims 1 through 11 and 13 through 29 as quoted above refers to three separate statutory provisions and is not articulated with particular clarity. At the oral hearing held on February 16, 1989, the examiner was questioned as to the precise statutory grounds of rejection and the theory underpinning the rejection. In response, the examiner stated that the rejection which appears on page 10 of the Answer (rejection 1) is based upon 35 U.S.C. 103. The reference in the statement of the rejection to 35 U.S.C. 102(a) and 35 U.S.C. 102(b) was intended to identify the source of the prior art. In other words, the examiner is relying upon the combination of ECTS and alleged public uses to establish the obviousness of the claimed invention as a whole within the meaning of 35 U.S.C. 103. The additional publications identified as "Micro-Trap" ("G"), Blueprint ("J") and "Asbestos" ("F") appear to be optionally relied upon to amplify the rejection. Stripped of all verbiage, the rejection is basically predicated upon an alleged public use which occurred at Cinnaminson, N.J. and/or at Moorestown, N.J. 2 In order to establish the alleged public use, the examiner has relied upon evidentiary material which includes alleged admissions of Patent Owner (appellant herein) and third party affidavits. 3 The preliminary issue which surfaces is whether this rejection predicated upon a prior public use, as formulated by the examiner, is appropriate in a reexamination proceeding. The examiner contends that the rejection is consistent with *Ex parte McGaughey*, 6 USPQ2d 1334 (BPAI 1988), inasmuch as the prior public use is "established by admissions in the record, in combination with printed publications . . ." (paragraph bridging pages 24 and 25 of the Answer). 4 [1] The issue resolved in *McGaughey* was *confined* to whether prior art *established* in the *patent record* by an unequivocal admis

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sion may be relied upon to support a rejection during a reexamination proceeding involving that patent. 5 The examiner would have us *extend* the holding in *McGaughey* by expanding the scope of reexamination proceedings to permit reliance upon prior art *established* by admissions *during a reexamination proceeding* and prior art *established* by admissions *in external court proceedings*. We need *not* resolve such issues since, in the situation before us, we find no prior art (public use) *established* by admissions in this reexamination proceeding or in any external court proceeding. The alleged *admissions* relied upon by the examiner appear in reference A and reference I. We have reviewed such evidence and, at best, we find only appellant's acknowledgements of certain activities related to the claimed invention, which activities are characterized as *experimental*. Note, for example, the following language in reference A: During the course of work at Cinnaminson in the summer of 1980, *experiments* were conducted with taping back the plastic sheets that formed the air lock, thus providing a relatively small opening formed by the slit. This, of course, *contrasted with accepted procedures at that time*, which required the work area to be *sealed* as tight as possible (page 11, emphasis supplied). Mr. Natale's next asbestos removal project was in Moorestown, New Jersey, a project which began in September 1980 and extended through the end of November. It



was there that *experiments* were first conducted with replacing the air lock by a plastic flap hung over the top of a slit in the plastic work area enclosure to form a flap seal. It is believed that the air inlet at the Moorestown job began simply with a vertical slit in the plastic wall, with horizontal slits at the bottom. It is also believed that *experiments* were begun with enlarging the air inlet opening to allow far greater volumes of air flow into the work area (page 13, emphasis supplied). The response to Interrogatory 22 6 reads in part as follows: (a) It is believed that the first complete use of the invention described and claimed in the Natale patent was for *testing and experimental purposes* beginning in early September 1980 and continuing to mid-December 1980 (emphasis supplied). (c) A defined air space within a building was established having at least one inlet of sufficient size to enable relatively large volumes of air to enter the space. The large volumes of air were drawn into the space through the inlet by a filtration unit. The air was then filtered and exhausted from the defined space. A flap seal arrangement was provided at the inlet to prevent air exiting the space when the filtration unit was shut down. 7 By no stretch of the imagination can the evidence relied upon by the examiner be considered to *establish* prior art under 35 U.S.C. 102(b) by an unequivocal admission. 8 Indeed, appellant has consistently, strenuously and unequivocally denied that the claimed invention was put in public use prior to the critical date. What the examiner has done is extract language which characterizes the activities as experimental and then combined the skeletal remains of the alleged admissions with the third party affidavits made of record by Requestor in the face of conflicting affidavits *to establish, for the first time during this reexamination proceeding, the existence of a public use under 35 U.S.C. 102(b)*. The impropriety of conducting such a fact-finding endeavor to support a rejection predicated upon a prior public use during a reexamination proceeding was recognized in *McGaughey*. Note the statement of the Board at 6 USPQ2d 1338 which reads as follows:

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This is not to say that the Office (Patent and Trademark Office) has been willing to open reexamination to any type of evidence that is available to the examiner during initial examination. The Commissioner has construed section 305 conservatively. Facts, including admissions which have already been established in the record, have been authorized for use in reexamination proceedings. See 37 CFR 1.106(c) and M.P.E.P. §2258 (footnote omitted). *The PTO has not authorized other types of evidence such as on-sale bars, public use issues or issues relating to fraud* (emphasis supplied). [2] We hold that the examiner has *no authority to engage in a fact-finding endeavor to establish* the existence of a public use under 35 U.S.C. 102(b) during a reexamination proceeding. Ergo, we shall not consider the evidentiary material relied upon by the examiner in his endeavor to establish a prior public use. The only remaining essential evidence relied upon by the examiner is ECTS. We again refer to the affidavit of Thomas Natale, paragraphs 21 and 22, wherein affiant reveals that the ECTS report was commissioned by appellant to document the work at the Cinnaminson project to satisfy the school district that the job was being performed competently and to document for internal purposes what was done at the job site. A total of only five or six copies of the report were made, three copies of which were sent to the Cinnaminson School District and one to the

architect representing the school district. [3] A document relied upon as a printed publication must have traversed into the public domain, *i.e.*, it must have been accessible to the public. *In re Bayer*, 568 F.2d 1357, 196 USPQ 670 (CCPA 1978). The burden of establishing that a document was publicly accessible rests upon the examiner as part of his burden of establishing a *prima facie* basis for denying patentability. *Constant v. Advanced Micro-Devices, Inc.*, 848 F.2d 1560, 7 USPQ2d 1057 (Fed. Cir. 1988); *In re Wyer*, 655 F.2d 221, 210 USPQ 790 (CCPA 1981). In attempting to discharge that burden, the examiner has merely relied upon Requestor's allegations that the ECTS report enjoyed wide distribution as advertising literature rather than proffer objective evidence of public accessibility of the ECTS report. In addition, the examiner would appear to have resorted to speculation as to whether the ECTS report was publicly accessible. In short, the examiner has failed to establish that the ECTS report was publicly accessible and, therefore, available as prior art. The additional references mentioned in the examiner's statement of rejection 1 would appear to be relied upon optionally to buttress the rejection predicated upon a prior public use. We need not, therefore, address the issue of whether the examiner has established that reference G and reference J were printed publications, specifically, accessible to the public. We reverse rejection 1 inasmuch as the examiner has not provided the requisite factual basis to support a legal conclusion of obviousness under 35 U.S.C. 103. **Rejection 2** Rejection 2 is reversed since Whitfield does not cure any of the deficiencies in rejection 1. **Rejection 3** It is the examiner's position that "Asbestos" describes the invention set forth in claims 1 through 11 and 13 through 15 within the meaning of 35 U.S.C. 102 or, alternatively, would have rendered the claimed invention obvious under 35 U.S.C. 103. A relevant portion of "Asbestos" appears at page 295 and reads as follows: The sheet area should be kept below atmospheric pressure by an extract fan fitted with an "absolute" filter so that the direction of the air flow is from the change room to the work zone. It may be necessary to fit ventilation flaps to the tent system at selected locations to improve ventilation in a particular area or where high extraction rates are required. The exact nature of the mentioned ventilation flaps and their operation are not apparent. Thus, it cannot be determined from the face of the "Asbestos" reference whether there is a disclosure of the sealing procedure set forth in step 4 of claim 1 or the sealing means appearing in claim 8. We shall not resort to speculation. *In re Warner*, 379 F.2d 1011, 154 USPQ 173 (CCPA 1967). [4] Apparently cognizant of the shortcomings of "Asbestos," the examiner takes notice of the fact that ventilation flaps in a tent system are normally understood to be capable of sealing the openings they control when they are closed (page 21 of the Answer). This noticed fact was challenged by appellant. Notwithstanding appellant's challenge for evidentiary support, the examiner maintained his position. The examiner's failure to provide objective evidence to support the challenged officially-noticed fact constitutes

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clear and reversible error. *Ex parte Nouel*, 158 USPQ 237 (Bd.App. 1967). Rejection 3 is, therefore, reversed. **Rejections 4 and 5** Rejections 4 and 5 are reversed for reasons which are apparent from the reversal of rejections 1 and 3 above. **REVERSED**

## Footnotes

Footnote 1. The critical date is November 23, 1980. Footnote 2. ECTS is a report of the work performed at the Cinnaminson project (Affidavit of Thomas Natale, paragraphs 21 and 22). Footnote 3. The third party affidavits are *contradicted* by numerous affidavits submitted by appellant. See the affidavits of Anthony Natale, Thomas Natale, Dr. Peter Frasca, Raymond S. Beck, the supplemental affidavits of Anthony Natale and Thomas Natale and the affidavit of George E. Hall. Footnote 4. The relevant reexamination statutory provisions are discussed at length in *McGaughey* and *Ex parte Horton*, 226 USPQ 697 (BPAI 1985). They include 35 U.S.C. §§301, 303 and 305. Footnote 5. At 6 USPQ2d 1338, the Board stated that For purposes of this appeal, we need not and do not consider whether other facts besides admissions established in the record are authorized under section 305. Footnote 6. Interrogatory 22 was generated during a civil action styled *Brand Mid-Atlantic, Inc. v. Anthony Natale, Duall Maintenance Co., t/a Duall, Inc., Microtrap, Inc. v. GPAC, Inc.*, Civil Action No. 86-7093, filed in the United States District Court for the Eastern District of Pennsylvania on December 5, 1986, which action was settled on December 2, 1987 by an agreement that included a dismissal of the lawsuit. As part of the settlement, the Brand Companies took a license under the Natale patent. Footnote 7. In the Supplemental Affidavit of Anthony Natale, paragraphs 2 through 5, affiant states that portion (c) which refers to an air inlet of sufficient size to enable relatively large volumes of air to enter the space is believed incorrect. Footnote 8. It is well settled that experimental activities do not constitute a public use or sale under 35 U.S.C. 102(b). See, for example, *City of Elizabeth v. American Nicholson Pavement*, 97 U.S. 126 (1877); *Barmag Barmer Maschinenfabrik AG v. Murata Machinery, Ltd.*, 731 F.2d 831, 221 USPQ 561 (Fed. Cir. 1984); *TP Laboratories, Inc. v. Professional Positioners, Inc.*, 724 F.2d 965, 220 USPQ 877 (Fed. Cir. 1984). Furthermore, payment does not *per se* create a 35 U.S.C. 102(b) bar. *Baker Oil Tools, Inc. v. Geo Vann, Inc.* 828 F.2d 1558, 4 USPQ2d 1210 (Fed. Cir. 1987).

- End of Case -

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## Ex parte Skinner

### U.S. Patent and Trademark Office, Board of Patent Appeals and Interferences 2 USPQ2d 1788

Decided November 25, 1986

No. 650-69 Headnotes

#### 10 PATENTS

1. Practice and procedure in Patent and Trademark Office -- Prosecution -- In general (§ 110.0901) Examiner who has reason to believe that functional limitation asserted to be critical to establishing novelty may be inherent characteristic of prior art must provide some evidence or scientific reasoning to establish reasonableness of such belief before applicant can be required to demonstrate that subject matter shown to be in prior art does not possess characteristic relied upon.

2. Practice and procedure in Patent and Trademark Office -- Prosecution -- In general (§ 110.0901) Examiner must, in case in which incentive to combine teachings of references is not readily apparent, explain why such combination of reference teachings is proper. Case History and Disposition:

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Application for patent of James F. Skinner, application, No. 427,717, filed September 29, 1982, for Mold, Molding Method and Molding article. From rejection of Claims 7-13, 20, and 21, applicant appeals. Affirmed in part.

Attorneys:

Hubert E. Dubb, and Fliesler, Dubb, Meyer and Lovejoy, both of San Francisco, Calif., for applicant.

Judge:

Before Winters, Goolkasian, and Emery, Examiners-in-Chief. Opinion TextOpinion By:

35 Goolkasian, Examiner-in-Chief. This is an appeal from the examiner's final rejection of claims 7 through 13, 20, and 21. Claims 1 through 6 and 14 through 19 remain in the case but stand withdrawn pursuant to a restriction requirement. Appellant's invention is directed to a mold of the type used to produce plastic articles. The claimed mold is very smooth and is characterized by having a surface portion having a surface roughness of no more than about  $12.5 \times 10^{-8}$  meters, RMS (root mean square). The mold surface is coated with a material which is substantially void-free, non-corroding, and has a Rockwell C hardness above about 60. This is achieved by vacuum deposition or sputtering of chromium or rhodium onto the mold surface. Claim 7 is illustrative and

reads as follows: 7. In a mold (24) useful for preparing a molded plastic article (10), the mold (24) having a mold surface (30) having a surface portion (32) which is replicated onto the molded plastic article (10), an improvement comprising: wherein said surface portion (32) has a surface roughness of no more than about  $12.5 \times 10^{-8}$  meters, RMS; and including a surface coating (34) covering said surface portion (32), said coating (34) being substantially void-free, substantially non-corroding when exposed to ambient atmospheric conditions, having a Rockwell C hardness above about 60 and having a surface roughness of no more than about  $12.5 \times 10^{-8}$  meters, RMS. The references relied on by the examiner are: Mizutani et al. (Mizutani) 4,138,086 Feb. 06, 1979 Nyman et al. (Nyman) 4,262,875 Apr. 21, 1981 Japan 54-25285 Feb. 26, 1979

Claims 7, 8, 11, and 12 stand rejected under 35 U.S.C. 102 over Mizutani. Claims 7 through 13, 20, and 21 stand rejected under 35 U.S.C. 103 over Mizutani in view of Nyman and further in view of Japanese Patent Pub. No. 54-25285. We consider first the rejection under 35 U.S.C. 102. The Mizutani reference is directed to a mold used for manufacturing contact lenses. The mold is composed of two metallic mold halves forming a cavity in which a silicone resin contact lens may be molded. The surface of each section of the mold is plated with chromium or nickel so that a contact lens having high surface optical quality can be manufactured. The mold is said to be plated with chromium or nickel and is said to impart excellent optical property to the surface of the lens. It is the examiner's position, as stated in the Final Rejection, that "[a]lthough the patentee does not explicitly disclose the properties claimed by applicant, such properties *may be* inherent characteristics of the reference coating." (Emphasis added.) 1 We reverse. [1] It is by now well settled that the burden of establishing a *prima facie* case of

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anticipation resides with the Patent and Trademark Office. *In re Piasecki*, 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed. Cir. 1984) quoting *In re Warner*, 379 F.2d 1011, 1016, 154 USPQ 173, 177 (CCPA 1967). It is the examiner's position that the mold of Mizutani *may* inherently have the characteristics of the claimed mold. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient. *In re Oelrich*, 666 F.2d 578, 581, 212 USPQ 323 (CCPA 1981). We are mindful that there is a line of cases represented by *In re Swinehart*, 439 F.2d 210, 169 USPQ 226 (CCPA 1971) which indicates that where an examiner has reason to believe that a functional limitation asserted to be critical for establishing novelty in the claimed subject matter may, in fact, be an inherent characteristic of the prior art, the examiner possesses the authority to require an applicant to prove that the subject matter shown to be in the prior art does not possess the characteristic relied on. Nevertheless, before an applicant can be put to this burdensome task, the examiner must provide some evidence or scientific reasoning to establish the reasonableness of the examiner's belief that the functional limitation is an inherent characteristic of the prior art. In the case before us, no such evidence or reasoning has been set forward. Appellant urges that the mold for a contact lens would not reasonably be expected to have a surface roughness of no more than about  $12.5 \times 10^{-8}$

8meters, RMS. In this regard, we note that appellant's specification indicates that the desired degree of surface smoothness is only achieved by polishing or diamond turning of the surface finish. See page 2, lines 12 through 14. Moreover, appellant utilizes a sputtering technique to apply the chromium onto the mold surface rather than a plating technique as utilized by the reference patent. Absent reasons on the part of the examiner regarding why the natural result of the process used to prepare the mold of Mizutani would have been to achieve the characteristics claimed by appellant's mold, a *prima facie* case of anticipation has not been established. See *In re Oelrich*, *supra*. Claims 7 through 13, 20, and 21 stand rejected under 35 U.S.C. 103 over Mizutani in view of Nyman and further in view of the Japanese reference. We have carefully considered all of appellant's arguments but are unpersuaded of error in the examiner's rejection with respect to claims 7 through 13. At the outset we note that appellant's specification indicates, as background, that it is known that molded plastic articles can be made with relatively smooth surfaces by providing a relatively smooth surface for the mold in which the article is manufactured. Relatively smooth surfaces are generally accomplished by machine grinding and lapping any portion of the mold surface which is to be replicated on a position on the plastic article where smoothness is desired. Appellant notes that surfaces having a roughness of 2.5 to 5 x 10<sup>-8</sup> meters, RMS, have been prepared in the art by polishing or diamond turning. We are in full agreement with the examiner that one of ordinary skill, desiring as smooth a surface as possible on the contact lens mold of Mizutani, would have considered it obvious to achieve a surface finish within the range claimed by appellant. The Nyman reference teaches quite clearly that a chromium layer on a mold serves to harden the surface of a mold and make it resistant to scratching of the surface by abrasive particles. We shall take official notice that chromium plated or chromium coated metal surfaces are more corrosion resistant than would be the base metal itself. Indeed, the Hackh's Chemical Dictionary definition of chromium describes chromium plating as "the electrolytic coating of metals with a layer of c.0.00001 in. thick over a layer of nickel which produces a non-corrodible surface." The Nyman reference also teaches that plating of chromium onto mold surfaces develops a film which is "rough" (column 2, lines 64-66) and suggests vapor deposition techniques, e.g., sputtering and the like to apply a less rough, thin, stress free conformal layer containing chromium. One of ordinary skill having the references before him would have considered it obvious to improve the mold surface of the Mizutani mold by finely polishing the metal backing material to the required extent and then sputtering a layer of chromium thereover to improve the hardness and oxidation exposure of the base metal. Claims 20 and 21, however, are directed to the use of rhodium as the metal in place of or in conjunction with chromium. The examiner relies on the Japanese reference for a teaching of utilizing a rhodium layer on the surface of a brass plate. The Japanese reference is directed to a method of making an ornamental part for a time piece (watch) by coating the part with a thin layer of compounds having a refractive index less than 2.41. Among the compounds which may be coated thereon are compounds of chromium, titanium, iron, copper, mercury, lead, and

bismuth. Specifically, rhodium is first deposited 2 onto the brass base metal. Subsequently, a chromium layer and chromium oxide layer are vacuum deposited 1thereon. The examiner has provided no information regarding why the Japanese reference used the rhodium coating as an undercoat and no reasons or incentive for  
5 utilizing the rhodium coating of the Japanese reference as an undercoat for the chromium of either Mizutani or Nyman. [2] To properly combine the references to reach the conclusion that the subject matter of claims 20 and 21 would have been obvious, case law requires that there must have been some teaching, suggestion, or inference in either reference, or both, or knowledge generally available to one of ordinary skill in the  
10 relevant art, which would have led one of ordinary skill in the art to combine the relevant teachings of the references. See *ACS Hospital System, Inc. v. Montefiore Hospital*, 732 F.2d 1572, 221 USPQ 929 (Fed. Cir. 1984). When the incentive to combine the teachings of the references is not readily apparent, it is the duty of the examiner to explain why combination of the reference teachings is proper. In other words; the  
15 examiner must indicate the reasons *why* one skilled in the art would have substituted the sputtered chromium/rhodium combination of the Japanese patent for the sputtered chromium of the Nyman reference when it was substituted for the metal plated chromium of the Mizutani patent. Absent such reasons or incentives, the teachings of the references are not combinable. We reverse the examiner's rejection. The examiner's rejection of  
20 claims 7, 8, 11, and 12 under 35 U.S.C. 102 is reversed. The examiner's rejection of claims 20 and 21 under 35 U.S.C. 103 is also reversed. The examiner's rejection of claims 7 through 13 under 35 U.S.C. 103 is affirmed. *AFFIRMED-IN-PART*

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**Footnotes**

Footnote 1. The quoted language appears in the office action mailed 11/22/83 (paper no. 5) which is expressly referred to in the Final Rejection. Footnote 2. The Derwent  
30 translation of the Japanese reference indicates that the rhodium layer is deposited at three thousand angstrom thickness by a process described as "metalising plating." While we would normally consider this to be an electroplating process, appellant's Brief (page 8) indicates that the rhodium is applied by vacuum deposition.

35 - End of Case -

Lindemann Maschinenfabrik GMBH v. American Hoist and Derrick Company et al.  
(CA FC) 221 USPQ 481 (3/21/1984)

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**Lindemann Maschinenfabrik GMBH v. American Hoist and Derrick  
Company et al.**

**U.S. Court of Appeals Federal Circuit  
221 USPQ 481**

**Decided Mar. 21, 1984  
No 83-1178 Headnotes**

## **PATENTS**

**1. Patentability/Validity -- In general (§ 115.01)** Statement by district court -- "But I am not certain in my own mind at this point whether or not these gentlemen on the '315 patent invented anything." reflects misconception of role of courts under 35 USC 103; question mandated by statute is not "invention," but patentability; moreover, court's role in relation to patentability does not require it to conclude whether something was or was not "invented," or whether court subjectively considers invention worthy of patent protection; court's role is actually more simple; under statute, it is to determine whether patent's challenger carried burden of establishing invalidity.

**2. Patentability/Validity -- Anticipation -- In general (§ 115.0701)** Anticipation is factual determination, reviewable under the "clearly erroneous" standard; anticipation requires presence in single prior art reference disclosure of each and every element of claimed invention, arranged as in claim; in deciding issue of anticipation, trier of fact must identify elements of claims, determine their meaning in light of specification and prosecution history, and identify corresponding elements disclosed in allegedly anticipating reference.

## **JUDICIAL PRACTICE AND PROCEDURE**

**3. Procedure -- Burden of proof (§ 410.35)** Statutory presumption of patent validity cannot "vanish" or be "weakened" and statutorily assigned burden of proof cannot be shifted; at same time, much confusion can be avoided by patentees who refrain from efforts to expand role of presumption beyond its burden-assigning and decisional approach-governing function; burden upon challenger of validity under 35 USC 282 is to introduce evidence of facts establishing invalidity, thus overcoming presumption; such evidence, if it is to carry the day, must be clear and convincing; because mere introduction of non-considered art, common phenomenon, does not "weaken" or otherwise affect presumption, there is no basis for adjusting required level of proof downward to "mere preponderance;" that clear and convincing standard may more easily be met when such non-considered art is more pertinent than cited art means that



determination of whether patent challenger has met burden turns on relationship of uncited art to claimed invention.

## **PATENTS**

**4. Patentability/Validity -- Obviousness -- Relevant prior art -- In general** (§ 115.0903.01) District court's view that "the 'Field of Search' is exactly what it purports to be and nothing more, that 'References Cited' are patents found within field which were actually considered by the examiner and listed because he found them to be most relevant," is flawed; examiner could not determine which patents are "most relevant" without considering number which are less relevant.

**5. Patentability/Validity -- Obviousness -- In general** (§ 115.0901)

## **JUDICIAL PRACTICE AND PROCEDURE**

**Procedure -- Burden of proof** (§ 410.35) Because touchstone is whether uncited art is sufficiently more relevant than that cited to serve as evidence of obviousness, argument respecting presumption based on uncited art's classification is pointless; view is erroneous that assignee bore burden of proving that uncited art had been considered; to extent that examiner's consideration of uncited art is material, burden is on challenger to show that prior art had not been considered; challenger meets that particular burden by showing that uncited art is more relevant than that cited, just as patentee defeats uncited art by showing that its relevancy is equal to or less than that cited.

## **PATENTS**

**6. Practice and procedure in Patent and Trademark Office -- Re-examination -- In general** (§ 110.1501) Although courts will give due respect to examiner's evaluation of prior art, they are not bound by it; patentees desiring benefit of examiner's evaluation of originally uncited art have available reexamination procedures under 35 USC 301-307.

**7. Patentability/Validity -- Obviousness -- Relevant prior art -- Particular inventions** (§ 115.0903.03) Waste compactor art is relevant to art of crushing massive metal scrap.

**8. Practice and procedure in Patent and Trademark Office -- Interference -- In general** (§ 110.1701) 35 USC 135, establishing and governing interference practice, recognizes possibility of near simultaneous invention by two or more equally talented inventors working independently, occurrence that may or may not be indication of obviousness when considered in light of all circumstances.

**9. Patentability/Validity -- Obviousness -- Evidence of** (§ 115.0906) Independent suggestion for invention, proposed five years after invention was made, is simply too late to be relevant to determination of whether invention would have been obvious at time it was made.

**10. Patentability/Validity -- Obviousness -- Commercial success (§ 115.0908)**

Showing of commercial success of claimed invention, wherever such success occurs, is relevant in resolving issue of non-obviousness; commercial success cannot by itself establish nonobviousness; however, it was error for district court, having concluded that claimed invention would have been obvious from prior art, to look only to see whether showing of commercial success was so overwhelming as to overcome that conclusion; all evidence must be considered before conclusion on obviousness is reached.

**11. Patentability/Validity -- Obviousness -- Evidence of (§ 115.0906)** Although not required in statute, evidence of unexpected results may be strong support for conclusion of nonobviousness.

**12. Patentability/Validity -- Obviousness -- Combining references (§ 115.0905)**

Fact that patent specifically stated that it disclosed and claimed combination of features previously used in two separate devices alone is not fatal to patentability; claimed invention must be considered as whole, and question is whether there is something in prior art as whole to suggest desirability, and thus obviousness, of making combination.

**13. Patentability/Validity -- Obviousness -- Evidence of (§ 115.0906)** Fact that claimed invention may employ known principles does not in itself establish that invention would have been obvious; most inventions do.

**14. Patentability/Validity -- Obviousness -- Combining references (§ 115.0905)**

Enablement is legal issue; question is whether disclosure is sufficient to enable those skilled in art to practice claimed invention; hence specification need not disclose what is well known in art.

**JUDICIAL PRACTICE AND PROCEDURE**

**15. Procedure -- In general (§ 410.01)** District court should decide validity and infringement and should enter judgment on both issues when both are raised in same proceeding; to enter judgment on less than all dispositive issues can be inefficient, risking as it does necessity of district court and parties undertaking participation in another long and costly court proceeding. **Particular patents -- Shearing Machines** 3,945,315, Lindemann, Hydraulic Scrap Shearing Machine, holding of invalidity of claims 1, 2, and 4, reversed. **Case History and Disposition:**

Page 482

Appeal from District Court for the Southern District of Texas, Sterling, J. Action by Lindemann Maschinenfabrik GMBH, against American Hoist and Derrick Company, Harris Press and Shear Division, and Commercial Metals Company, for patent infringement, in which defendants counterclaim for declaration of patent invalidity. From judgment for defendants, plaintiff appeals. Reversed and remanded.

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**Attorneys:**

- 5 David Toren, New York, N.Y. (Jules Goldberg, New York, N.Y., on the brief) for  
appellant. Michael E. Macklin, Houston, Tex. (Edward W. Goldstein, Houston, Tex., on  
the brief) for appellee.

**Judge:**

- 10 Before Markey, Chief Judge, Cowen, Senior Circuit Judge, and Bennett, Circuit Judge.  
**Opinion Text****Opinion By:**

Markey, Chief Judge. Appeal from the May 23, 1983, judgment of the District Court for  
the Southern District of Texas, sitting without a jury and holding invalid claims 1, 2, and  
15 4 of appellant's (Lindemann's) U.S. Patent No. 3,945,315 issued March 23, 1976 and  
entitled "Hydraulic Scrap Shearing Machine". We *reverse and remand*.  
**BACKGROUND The Patent** United States Patent No. 3,945,315 ('315) issued March 23,  
1976 on an application filed April 16, 1975. Peter Dahlem and Hubert Milles are named  
co-inventors and Lindemann is listed as the assignee. The '315 patent claims a priority  
20 filing date, under 35 U.S.C. §119, of May 13, 1974, based on West German application  
2423003. Hydraulic scrap shears, the subject matter of the '315 patent, are a principal tool  
of the scrap metal industry. The shears are large, often weighing several hundred tons,  
and are designed to cut scrap metal into smaller, uniform pieces for recycling. There are  
two basic types of metal processed in the shears: "peddler's scrap" and "rigidly massive  
25 scrap". Peddler's scrap consists of light to medium gauge metal objects, such as light  
tubing, automobile bodies, and window frames. It makes up a large percentage of the  
available scrap and is comparatively easy to process. Rigidly massive scrap consists of  
heavy gauge metal objects, such as boilers, oil tanks, and railroad cars. Because of  
thickness or internal reinforcements, massive scrap objects are difficult to process.  
30 Traditionally, massive scrap had been processed in very large, tremendously powerful  
shears, or had been pretreated, e.g., with oxyacetylene torches, to reduce its size or  
weaken its internal reinforcements. Either approach was costly and time-consuming.  
Many scrap dealers handled peddler's scrap exclusively. **The Invention** The '315 patent  
contains five claims. Claim 1, the only independent claim, is written in Jepson form: 1.  
35 In a hydraulic scrap-shearing machine comprising an open feed channel having two  
opposing side walls, scrap shears at one end of said feed channel and having a mouth  
narrower than the normal width of said feed channel between said side walls, hydraulic  
means for moving at least one of said side walls towards the other of said side walls  
whereby scrap placed in said feed channel can be squashed to a final width no greater  
40 than the width of said mouth of said scrap shears, and a feeder ram for pushing scrap  
along said feed channel into said mouth of said scrap shears, the improvement consisting  
of said movable one of said side walls being divided into two longitudinal portions of  
different lengths, and said hydraulic means comprising a main hydraulic ram having a  
working face forming the longer portion of said movable side wall, and an auxiliary  
45 hydraulic ram having a working face forming the shorter portion of said movable side  
wall just upstream of said mouth of said scrap shears, said auxiliary hydraulic ram being

capable of operation independently of said main hydraulic ram. The claimed structure is shown in Figure 2 of the '315 patent:

*Tabular, graphic, or textual material set at this point is not available. Please consult hard copy or call BNA PLUS at 1-800-452-7773 or 202-452-4323.*

In operation, the combined rams (17, 19) advance into the feed channel (9), crushing and compacting the scrap (12) against the other, non-movable sidewall (14). With peddler's scrap, the two rams move the entire distance together. However, when the channel contains rigidly massive scrap, such as shown at (12), the two rams are quickly brought to a standstill by the scrap's resistance to crushing. The auxiliary ram (19) is then moved forward independently of the main ram (17). The auxiliary ram, having a smaller working surface than the combined rams, is capable of applying a greater crushing force to the scrap. The auxiliary ram cracks and buckles the scrap directly in front

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of it to crush the leading end of the scrap so it can be pushed through the mouth of the shears. That action also propagates that effect to an adjacent area (H) of the scrap. The structural integrity of the scrap is thus overcome by the auxiliary ram, thereby reducing the resistance of the portion of the scrap in contact with the main ram, allowing both rams to continue forward to crush the scrap to a width less than that of the shear mouth. The feeder ram (11) then pushes the crushed scrap through the mouth of the shear and under the shear blades (at 5) and clamp (at 6). The clamp holds the crushed scrap in place during cutting. The claimed invention allows one machine of moderate size to process both peddler's and rigidly massive scrap, and to do so quickly, inexpensively, and without the need for pretreating massive scrap. Unchallenged testimony described crushing accomplished in minutes of scrap that would have required hours to crush in earlier larger machines and that could not have been crushed without pretreatment. **District Court Proceedings** On October 5, 1980, Lindemann sued appellees (collectively "Amhoist") for infringement of claims 1, 2, and 4 of the '315 patent. Amhoist asserted non-infringement and counterclaimed for a declaratory judgment that the '315 patent is invalid. A three day trial was conducted on June 21-23, 1982. On May 23, 1983, the district court entered FINDINGS OF FACT AND CONCLUSIONS OF LAW, the introduction of which stated: After hearing all the evidence the Court concludes that the patent is invalid. Plaintiff simply incorporated two admittedly well-known metal compression features in the same machine and sought to gain a monopoly in the use of knowledge that had previously existed in the public domain. The Court finds and concludes that the claimed invention of the Plaintiff does not meet the statutory or constitutional requirements established for patent protection. Specifically, the machine was an obvious aggregation of prior art which produced no new or synergistic result. It failed materially to promote the progress of science and the useful arts. The district court entered 60 findings and 20 conclusions indicating its view that the '315 patent is invalid under 35 U.S.C. §102(b), 35 U.S.C. §103, and 35 U.S.C. §112. [1] On May 24, 1983 the district court entered judgment declaring the '315 patent invalid. The judgment is silent respecting infringement, though the district court had stated from the bench at end of trial: Well, if the '315 patent is valid, I think the proof is clear that it has been infringed and it is pretty clear that it was done with knowledge, conscious knowledge to the point of willful

infringement. 1 *Issues* I. Whether the district court erred in finding the inventions set forth in claims 1, 2, and 4 anticipated by U.S. Patent 3,763,770 ('770) under 35 U.S.C. §102(b). II. Whether the district court erred in concluding that the inventions set forth in claims 1, 2, and 4 would have been obvious under 35 U.S.C. §103. III. Whether the district court erred in concluding that the '315 patent specification was non-enabling under 35 U.S.C. §112. IV. Whether this court on remand should order entry of a judgment that claims 1, 2, and 4 were infringed by Amhoist. *OPINION* Of the district court's 60 findings, 57 were those submitted by Amhoist before trial. The source of findings does not render the "clearly

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erroneous" standard of Fed.R.Civ.P. 52(a) any less applicable or binding. Rosemount, Inc. v. Beckman Instruments, Inc., Nos. 83-947, 1238, 1251, slip op. at n. 4, 221 USPQ 1, 5 n. 4 (Fed. Cir. Feb. 9, 1984). In adhering firmly to that rule, however, an apparent absence of personal attention need not be disregarded. See Amstar Corporation v. Domino Pizza, Inc., 615 F.2d 252, 258, 205 USPQ 969, 974 (5th Cir. 1980), Wilson v. Thompson, 593 F.2d 1375, 1384 n.16 (5th Cir. 1979). Under such circumstances, one court has indicated that strict scrutiny is appropriate. See Smith International, Inc. v. Hughes Tool Co., 664 F.2d 1373, 215 USPQ 592 (9th Cir. 1982). Where, as here, the adopted findings are those proposed by a party *before trial*, a greater chance is created that those findings may be clearly erroneous. Indeed, the present findings include some for which no supporting evidence was submitted at trial. Having written them, Amhoist argues strenuously for retention of the findings behind the shield of the "clearly erroneous" rule, and repeatedly reminds us of our duty to review the findings favorably and of the burden resting on the appellant. However salutary, the rules governing review do not envision an appellate court shirking its duty to reverse an appealed judgment that is clearly based on legal error and unsupported by evidence in the record. We review judgments, not the rhetoric in opinions. Nonetheless, the language in an opinion, or in a set of findings and conclusions, may indicate that numerous harmful errors of law produced an erroneous conclusion, and that the decisional approach of the district court led to a judgment not supported in law by the facts of record. That happened here.

### *I. Anticipation [2]*

Anticipation is a factual determination, reviewable under the "clearly erroneous" standard. Carmen Industries Inc. v. Wahl and Vibra Screw Inc., No. 83-683, slip op., 220 USPQ 481 (Fed. Cir. December 27, 1983), Kalman v. Kimberly-Clark Corp., 713 F.2d 760, 218 USPQ 781 (Fed. Cir. 1983), F.R.C.P. 52(a). "A finding is 'clearly erroneous' when although there is evidence to support it, the reviewing court on the entire evidence is left with the definite and firm conviction that a mistake has been committed." United States v. U.S. Gypsum Co., 333 U.S. 364, 395, 76 USPQ 430, 444 (1948); SSIH Equip. S.A. v. USITC, 718 F.2d 365, 381, 218 USPQ 678, 692 (Fed. Cir. 1983). Anticipation requires the presence in a single prior art reference disclosure of each and every element of the claimed invention, arranged as in the claim. Connell v. Sears, Roebuck & Co., 722 F.2d 1542, 220 USPQ 193 (Fed. Cir. 1983); SSIH Equip. S.A. v. USITC, 718 F.2d 365, 218 USPQ 678 (Fed. Cir. 1983). In deciding the issue of anticipation, the trier of fact

must identify the elements of the claims, determine their meaning in light of the specification and prosecution history, and identify corresponding elements disclosed in the allegedly anticipating reference. SSIH, supra; Kalman, supra. Lindemann contends the district court's finding on anticipation is clearly erroneous and we agree. The finding of anticipation rested on a series of mistakes. The two gags of the '770 patent do not correspond to "said sidewall being divided into two portions of different lengths." The gags are beyond the end of the wall and constitute no part of a feed channel sidewall as claimed. The court found the '770 patent's magazine corresponded to the claimed "open feed channel having two opposing walls," but the "movable" wall of the magazine is movable only to adjust the magazine's width and not, as the claim requires, to crush scrap. Moreover, the findings that the magazine is the feed channel and that the gags are parts of a sidewall of the channel contradict each other. Nor does the shear anvil of the '770 patent, as the court stated, correspond to the "opposite sidewall" of the claim. Nor do the cylinder assemblies of the '770 patent move one sidewall of a feed channel toward the other as the claims require. Nor are the '770 patent's cylinder and gag (equated by the court to the claimed auxiliary ram) located "just upstream of said mouth." They are within the shear area and are thus downstream from where a mouth narrower than the feed channel would be if the '770 patent disclosed such a mouth, which it does not. Similarly, the other cylinder and gag of the '770 patent do not form a "longer portion of said movable sidewall." Nor can the channel that receives rod cuttings after shearing be equated, as did the district court, with the shear mouth claimed. 2 The '770 patent discloses an entirely different device, composed of parts distinct from

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those of the claimed invention, and operating in a different way to process different material differently. Thus there is presented here no possible question of anticipation by equivalents. See *Tate Engineering, Inc. v. United States*, 477 F.2d 1336, 1342, 175 USPQ 115, 119 (Ct. Cl. 1973). It is clear, moreover, that the device disclosed in the '770 patent, had it come after issuance of the '315 patent, could not be found an infringement of the asserted claims. The district court's analysis treated the claims as mere catalogs of separate parts, in disregard of the part-to-part relationships set forth in the claims and that give the claims their meaning. On the unchallenged evidence of record, we are left with a "definite and firm conviction" that the district court's finding of anticipation was mistaken and therefore clearly erroneous. That part of its judgment relating to invalidity under 35 U.S.C. §102(b) must therefore be reversed. **II. Obviousness** **A. Presumption of Validity** Guided by remarks found in then applicable court opinions, the district court: (1) viewed the statutory presumption of validity, 35 U.S.C. §282, as "vanished" or "severely weakened" when Amhoist introduced prior art not cited by the examiner; (2) reduced the required burden of proof, in light of that introduction, to a "mere preponderance" 3 ; and (3) implicitly required Lindemann to prove that the uncited art had been considered by the PTO. [3] (1) Courts are not, of course, at liberty to repeal a statute, or to legislate conditions diminishing its effect. Hence the statutory presumption cannot "vanish" or be "weakened" and the statutorily assigned burden of proof cannot be shifted. *Stratoflex Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 218 USPQ 871 (Fed. Cir. 1983). At the same time, much confusion can be avoided by patentees who refrain from efforts to expand the

role of the presumption beyond its burden-assigning and decisional approach-governing function. (2) The burden upon the challenger of validity under 35 U.S.C. §282 is to introduce evidence of facts establishing invalidity (thus overcoming the presumption). *American Hoist & Derrick Company v. Sowa & Sons, Inc.*, No. 83-555/564, Slip op., 220 USPQ 763 (Fed. Cir. January 12, 1984). That evidence, if it is to carry the day, must be clear and convincing. *Radio Corp. v. Radio Laboratories*, 293 U. S. 1, 21 USPQ 353 (1934). Because the mere introduction of non-considered art (a common phenomenon) does not "weaken" or otherwise affect the presumption, there is no basis for adjusting the required level of proof downward to a "mere preponderance". That the clear and convincing standard may more easily be met when such non-considered art is *more* pertinent than the cited art means that determination of whether the patent challenger has met its burden turns on the relationship of the uncited art to the claimed invention. *Stratoflex*, supra.; *Railroad Dynamics Inc. v. A. Stucki*, No. 83-951/961, slip op., 220 USPQ 929 (Fed. Cir. January 25, 1984), *Solder Removal v. USITC*, 582 F.2d 628, 199 USPQ 129 (CCPA 1978). [4] (3) Similarly, the parties have devoted much unnecessary argument to the question of whether Lindemann is entitled to a presumption that the examiner had considered the uncited art because it is found in the classes and subclasses searched by the examiner (and because, as Lindemann says, the examiner had cited that art in examining an earlier application). Authorities are cited on both sides. 4 [5] [6] Because the touchstone is whether the uncited art is sufficiently more relevant than that cited to serve as evidence of obviousness, argument respecting a presumption based on the uncited art's classification is pointless. The argument here, moreover, appears to have led to the erroneous view that Lindemann bore the burden of proving that the uncited art had been considered. To the extent that the examiner's consideration of uncited art is material, the burden is on the challenger to show that "that prior art had *not* been considered." *Richdel Inc. v. Sunspool Corp.*, 714 F.2d 1573, 219 USPQ 8 (Fed. Cir. 1983). The challenger meets that particular burden by showing that the uncited art is more relevant than that cited, just as the

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patentee defeats the uncited art by showing that its relevancy is equal to or less than that cited. 5 ***B. Scope and Content of the Prior Art*** 6 "The scope of the prior art has been defined as that 'reasonably pertinent to the particular problem with which the inventor was involved'." *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1535, 218 USPQ 871, 876 (Fed. Cir. 1983) (and cases cited therein). The district court defined the problem here broadly, i.e., as the problem of compressing waste materials. That finding is clearly erroneous. The inventors' problem was the crushing of massive metal scrap. Nothing in the prior art relied on as invalidating had any relation whatever to the crushing of massive metal scrap. [7] Lindemann attempts too much in arguing that waste compactors are non-analogous. Though the problems differ, both parties manufacture both products and both are exhibited at the same trade shows. Art that is analogous may or may not render a claimed invention obvious. As indicated below, it does not do so here. The content of the prior art discussed in Amhoist's brief is that disclosed in the '770 patent (discussed above) and in British Patent No. 1,230,014 ('014). 7 The '014 patent discloses a compactor for particulate waste, e.g., garbage. The loose waste is pressed into the wide mouth of a

funnel by a circular plate. The smaller end of the funnel communicates with a container to receive the compacted waste. A small finger-like ram is coaxial with, and normally moves with, the plate. When the material fills the funnel so tightly that the plate can add no more, the separately operable small ram can be advanced ahead of the main ram and into the waste material. The small ram has a diameter smaller than that of the funnel outlet. When the small ram has pressed a core of waste material through the funnel outlet, the remaining waste material is loosened and additional waste material may then be pressed into the funnel by the plate and ram working together. [8] [9] In a conclusion of law, the district court stated that it had considered the facts in light of the inquiries mandated by *Graham v. John Deere & Co.*, 383 U. S. 1, 148 USPQ 459 (1966), and that a strong indication supporting its conclusion of obviousness was "the fact that three individuals independently created the designs which resulted in development of the split ram shears which are the subjects of this lawsuit." Because the statute, 35 U.S.C. §135, (establishing and governing interference practice) recognizes the possibility of near simultaneous invention by two or more equally talented inventors working independently, that occurrence may or may not be an indication of obviousness when considered in light of all the circumstances. See *E.I. DuPont de Nemours & Co. v. Berkley & Co.*, 620 F.2d 1247, 205 USPQ 1 (8th Cir. 1980). In this instance, it clearly is not. Two of the three individuals were Dahlem and Milles, the co-inventors listed on the '315 patent. The third was an Amhoist employee who claimed at trial to have proposed the split ram in January of 1979, more than five years after the invention was made by Lindemann's assignors, nearly three years after the '315 patent issued, and well after Amhoist's employee Bleeland had in England observed and photographed a Lindemann shear embodying the claimed invention. Accepting, as we must, the district court's crediting of the testimony respecting independent suggestion by an Amhoist employee, that suggestion was simply too late to have been relevant to a determination of whether the invention would have been obvious at the time it was made, 35 USC §103, which was more than five years earlier. *C. Commercial Success*. [10] The district court improperly discounted the weight due the evidence of commercial success because that success occurred abroad. A showing of commercial success of a claimed invention, wherever such success occurs, is relevant in resolving the issue of nonobviousness. *Weather Engineering Corp. v. United States*, 614 F.2d 281, 204 USPQ 41 (Ct.Cl. 1980). The evidence at trial showed that the claimed invention accounted for 30% of Lindemann's total sales worldwide for a total sales price of over \$20,000,000 (30 machines at approximately \$667,000 each). The district court correctly stated that commercial success

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cannot by *itself* establish nonobviousness. However, having concluded that the claimed invention would have been obvious from the prior art, the court looked only to see whether the showing of commercial success was so overwhelming as to overcome that conclusion. That was error. All evidence must be considered *before* a conclusion on obviousness is reached. *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 218 USPQ 871 (Fed. Cir. 1983), *Kansas Jack, Inc. v. Kuhn*, 719 F.2d 1144, 219 USPQ 857 (Fed. Cir. 1983), *Gore & Associates v. Garlock*, 721 F.2d 1540, 220 USPQ 303, 314 (Fed. Cir.



1983). The commercial success here shown is evidence that the claimed invention was not obvious to those who paid 2/3 of a million dollars for each machine to escape the previously perceived need for pretreatment of massive scrap. *D. Unexpected Results* [11] The district court ignored the unexpected or surprising results achieved by the claimed invention. Though no requirement for such results is present in the statute, 35 U.S.C. §103, *Chore-Time Equipment, Inc. v. Cumberland Corp.*, 713 F.2d 774, 218 USPQ 673 (Fed. Cir. 1983), evidence of unexpected results may be strong support for a conclusion of nonobviousness. *Kansas Jack, Inc. v. Kuhn*, 719 F.2d 1144, 219 USPQ 857 (Fed. Cir. 1983). Neither the district court nor Amhoist's brief on appeal has a word to say about the unexpected results asserted by Lindemann, namely, the rapid crushing of rigidly massive scrap in a moderate sized scrap shear without pretreatment. That the claimed inventions achieve those results is unchallenged. Neither the district court nor Amhoist suggest anything in any piece of prior art, or in the prior art as a whole, that would lead one skilled in the art to expect achievement of such results. The record is clear that no earlier shears of any size, and no prior art device of any type could economically process rigidly massive scrap without pretreatment. Unchallenged testimony of experts was characterized by surprise and amazement that the claimed invention was able to accomplish that feat. That it could do so in minutes, and with a moderate sized structure, were further sources of surprise. That those skilled in the art had previously believed pretreatment of rigidly massive scrap was required was also uncontradicted. It is further clear from the uncontradicted evidence that the claimed invention achieved new and unexpected results nowhere suggested in the prior art, and that the district court overlooked the effect of that achievement in reaching its determination of obviousness. In so doing, the district court erroneously focussed its inquiry "solely on the product created, rather than on the obviousness or nonobviousness of its creation." *General Motors Corp. v. U. S. International Trade Commission*, 687 F.2d 476, 482-83, 215 USPQ 484, 489 (CCPA 1982). The district court viewed the claimed invention as merely the "aggregation" of two different sized rams. Finding the first in one place in the prior art and the second in another place, the district court entered this conclusion: Plaintiff simply put the two features in the same machine and connected them as was necessary depending on whether the scrap was small or large. It used a known connection idea. The '315 machine possessed one known feature to operate in a known way to produce a known result to deal with the first scrap situation and another known feature operating in a known manner to produce a known result to deal with the second. Clearly, this was an obvious solution using already appreciated or obvious features to solve the problem of how to develop a machine that could handle both types of scrap most economically. [12] The '315 patent specifically stated that it disclosed and claimed a combination of features previously used in two separate devices. That fact alone is not fatal to patentability. The claimed invention must be considered as a whole, and the question is whether there is something in the prior art as a whole to suggest the desirability, and thus the obviousness, of making the combination. In *re Imperato*, 486 F.2d 585, 179 USPQ 703 (CCPA 1973); In *re Sernaker*, 702 F.2d 989, 217 USPQ 1 (Fed. Cir. 1983). That question must here be answered in the negative. Nothing in the references alone or together suggests the claimed invention as a solution to the problem of crushing rigidly massive scrap. There was nothing whatever of record, therefore, to support the district court's statement that the claimed machine possessed "another known procedure operating in a known manner to

produce a known result" or its conclusion that Lindemann "knew \* \* \* that a small sidewall ram could most economically process large scrap." [13] The '014 patent deals only with soft, easily compactible, particulate material. Though that patent discloses a two-ram structure and the principle that loose material when too tightly compacted can be loosened by injection of a thin ram into the material, the claims here are not drawn to the mere

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concept of two differently sized rams, or to the known principles governing the effects of large and small rams (or to the propagation of force principle discussed at trial). That the claimed invention may employ known principles does not in itself establish that the invention would have been obvious. Most inventions do. Nothing in the '014 patent would suggest that rigidly massive scrap could be rapidly and economically crushed and sheared without pretreatment. The '770 patent, as above indicated, deals only with holding brittle material within a shear by compression. Nothing in the '770 patent suggests that making the crushing wall of a metal scrap shear in two independently operable parts, with a smaller part adjacent the mouth of the shears, would enable the crushing of massively rigid scrap without pretreatment. Nothing, moreover, in the '014 or '770 patents adds anything to the prior art considered by the examiner. As above indicated, the '315 specification itself recognized the separate presence in the prior art of feed channels with one solid moveable crushing wall and of feed channels with a small ram in one of two fixed sidewalls. The examiner cited as "of interest" the Pioch patent which, like the '014 patent, disclosed two independently operable pushers in a waste compactor. Applying the standard of Rule 52(a), Fed. R. Civ. P., we are persuaded that the findings underlying the district court's conclusion of obviousness are clearly erroneous. Further, that conclusion resulted from errors of law in interpreting the claims and in consideration and application of the prior art. That part of the appealed judgment relating to 35 U.S.C. §103 must therefore be reversed. *III. Enablement* The district court concluded that the '315 patent was non-enabling because it did not disclose a hydraulic and electrical system for controlling the operation of the rams. [14] Enablement is a legal issue. *Raytheon v. Roper Corp.*, No. 83-851, Slip op., 220 USPQ 592 (Fed. Cir. December 30, 1983). The question is whether the disclosure is sufficient to enable those skilled in the art to practice the claimed invention, hence the specification need not disclose what is well known in the art. *In re Myers*, 410 F.2d 420, 161 USPQ 668 (CCPA 1969). The unchallenged evidence of record establishes that hydraulic and electrical systems for metal scrap shears were well known to those skilled in the art, and that the selection and connection of the elements of such systems was simply a matter of plumbing. *Amhoist* points to testimony relating to 800 man hours it expended in developing its split ram shear. It also points to the dismantling of the accused machines by its two customers, whereby the rams are operated together as one sidewall and asserts that the split ram structure of the claimed invention has thus been abandoned by those customers. 8 There is no evidence indicating that the dismantling was due to difficulty in designing a suitable hydraulic-electric control system. It is clear that no undue experimentation was required in practicing the claimed invention. *W.L. Gore & Assoc. Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1557, 220 USPQ 303, 316 (Fed. Cir. 1983).

Amhoist spent approximately 100 more hours than did Lindemann in designing the entire split ram shear, including the hydraulic-electric control system. There was no evidence of the amount of time needed to develop the control system itself. Of the total time Amhoist spent on developing its shear, it devoted an undisclosed attempting to create a "hydraulically operated pin" to connect the two rams. That pin was unnecessary. The '315 patent's specification discloses a simple mechanical pin to achieve the same connection. Further, Amhoist conceded at oral argument that nothing in the claims fails of enablement in the specification. The district court erred in its conclusion that the '315 patent specification is non-enabling and that part of the appealed judgment relating to 35 U.S.C. §112 must be reversed. **IV. Infringement** Relying on the statement made by the district court at close of trial, and on the uncontested evidence clearly establishing Amhoist's knowledge of the '315 patent and its conscious decision to disregard it, Lindemann requests this court to "affirm" the district court's "decision" on infringement. Lindemann's difficulty is that judgments, not statements, are appealed and the district court made no finding entered no judgment on infringement. [15] A district court should decide validity and infringement and should enter a judgment on both issues when both are raised in the same proceeding. *Stratoflex v. Aeroquip*,

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713 F.2d 1530, 218 USPQ 871 (Fed. Cir. 1983). To enter judgment on less than all dispositive issues can be inefficient, risking as it does the necessity of the district court and the parties undertaking participation in another long and costly proceeding. The case must be remanded for the district court to make a finding on infringement. Whether the present record supports a findings corresponding with the court's end-of-trial statement, and whether further trial on the issue is therefore unnecessary, is for the district court to determine in the first instance. Upon any finding of infringement and entry of judgment on that finding, the district court will doubtless consider issuance of an injunction against further infringement and an accounting. **Decision** The district court's judgment is reversed and the case is remanded for further proceedings consistent with this opinion. Reversed and remanded.

## Footnotes

Footnote 1. The district court stated at the same time, "But I am not certain in my own mind at this point whether or not these gentlemen on the '315 patent invented anything." The statement reflects a misconception of the role of the courts under 35 U.S.C. §103. The question mandated by statute is not "invention"; it is patentability. See Rich, *Escaping the Tyranny of Words -- Is Evolution in Legal Thinking Impossible?*, 60 JPOS 71, May-June/APLA Bull. 237 (1978). Moreover, the court's role in relation to patentability does not require it to conclude whether something was or was not "invented," or whether the court subjectively considers the invention "Worthy" of patent protection. The court's role is actually more simple. Under the statute, it is to determine whether the patent's challenger carried the burden of establishing invalidity. 35 U.S.C.

§282. See *Environmental Designs, Ltd. v. Union Oil Co. of Cal.*, 713 F.2d 693, 218 USPQ 865 (Fed. Cir. 1983), *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 218 USPQ 871 (Fed. Cir. 1983), *Rosemount, Inc. v. Beckman Instruments*, No. 83-947/1238/1251, Slip. op., 221 USPQ 1 (Fed. Cir. February 9, 1984). Footnote 2.

5 Amhoist says Lindemann's Australian counsel "conceded" that the '770 patent cited by the Australian examiner was a "paper anticipation." The assertion is meaningless. First, the '315 patent's counterpart issued in Australia. Second, the language and laws of other countries differ substantially from those in the United States. Footnote 3. The district court in a conclusion of law also stated that "under any burden of persuasion the '315  
10 patent is invalid because of obviousness." As indicated in the text, we disagree. Footnote 4. The district court indicated the view that "the 'Field of Search' is exactly what it purports to be and nothing more, that 'References Cited' are the patents found within the field which were actually considered by the examiner and listed because he found them to be most relevant." That view is flawed. The examiner could not determine which patents  
15 are "most relevant" without considering a number which are less relevant. Footnote 5. Though the courts will give due respect to the examiner's evaluation of prior art, they are not of course bound thereby. Patentees desiring the benefit of the examiner's evaluation of originally uncited art have available the reexamination procedures under 35 U.S.C. §§301-307. Those procedures were not employed in this case. Footnote 6. The level of  
20 skill is not of record and is not discussed in the briefs. Footnote 7. The district court additionally discussed the S-501 shear produced by Amhoist and incorporating a tapered feed channel with a single side ram about one foot from the shear mouth. Amhoist correctly recognizes on appeal the absence of need to discuss the S-501 shear. Footnote 8. The record does not reflect the rationale underlying a vigorously fought lawsuit and its  
25 accompanying expense in the light of two sales and both purchasers' cessation of use of the invention.

**- End of Case -**

# DEPENDENCE OF THE COMPOSITION AND STRUCTURE OF SILICIC ACID XEROGELS ON THE NATURE OF THE SOLVENT

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The hydrolysis process of tetraethoxysilane in a medium of ketones, lower aliphatic alcohols, and ethylene glycol monoesters was studied by methods of calorimetry and complex thermal and IR spectroscopic analyses. It was established that the rate and degree of hydrolysis of tetraethoxysilane and also the composition and structure of the final hydrolysis products (silicic acid xerogels) can be regulated by changing the nature of the solvent to obtain binders of different designations.

It is known that the nature of the solvent has a significant effect on the conformation of macromolecules of organic polymers and also on their structure as a whole [1]. However, at the present time it is insufficiently clear as to whether this effect is retained on the composition and structure of polyalkoxysiloxanes, obtained by partial hydrolysis of ethyl orthosilicate-tetraethoxysilane (TEOS).

The effect of the nature of the organic solvent, the length of its hydrocarbon group, and dielectric constant  $\epsilon$  on the acidic hydrolysis process of tetraethoxysilane and the composition and structure of silicic acid xerogels was studied in this research by methods of calorimetry and complex thermal and IR spectroscopic analyses.

Sodium bisulfate was used as the hydrolysis catalyst. The catalyst concentration, TEOS:H<sub>2</sub>O mole ratio, and TEOS:solvent volume ratio were held constant. Organic solvents were selected with consideration of their mutual solubility with water and TEOS from a series of ketones (acetone, methyl ethyl ketone, methyl isobutyl ketone), lower aliphatic alcohols (methanol, ethanol, isopropanol, isobutanol), and monosubstituted diethylene glycol ethers (methyl, ethyl, butyl cellosolves).

Solvents were dried and purified by known methods [2]. The dependence of the rate and degree of hydrolysis of tetraethoxysilane on participation in the protolytic reaction of solvents, differing in chemical nature (proton donors - ketones, proton acceptors - alcohols, ethylene glycol ethers) and physical properties (dielectric constant, boiling point) [3] is presented in Table 1. The degree of the hydrolysis reaction was calculated from the total heat liberation [4]. As is seen from the presented data, the degree of occurrence of the homogeneous hydrolysis reaction depends on the nature of the solvent (upon comparison of solvents, differing in class) and also on the dielectric constant (upon comparison of solvents, common in chemical nature).

Since a salt catalyst was used in the research, the degree of its dissociation in mixed aqueous organic solvents varies [5]. Addition to an aqueous solution of the NaHSO<sub>4</sub> salt of solvents with a relatively high dielectric constant ( $\epsilon > 18$ ) causes a decrease in its degree of dissociation, and the salt precipitates, thus changing the medium pH.

Experimental data on the determination of pH of the studied aqueous organic solutions showed that the acidity is higher in ethyl-containing media (Table 1). This fact is explained by the fact that ethyl-containing solvents can substitute water molecules in the hydrate shell of a proton [5]. The pH of such systems increases in the limits of each individually taken series of solvents and can probably serve as an explanation of the anomalously high hydrolysis indices of tetraethoxysilane in these media.

Basicity increases with an increase in the length of the molecular chain of proton-

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Table 1

Dependence of the Degree of TEOS Hydrolysis  
on Physicochemical Indices of Solvents

Solvent	Structural formula	$\epsilon$	$T_p, K$	$Q, kJ/kg \cdot deg$	Degree of hydrolysis, %	pH
Acetone	$CH_3-C(O)-CH_3$	20.9	328.2	54.6	61	1.64
Methyl ethyl ketone	$CH_3-C(O)-C_2H_5$	18.4	352.6	65.5	65	1.45
Methyl isobutyl ketone	$CH_3-C(O)-CH_2-CH-(CH_3)_2$	16.7	403.0	50.9	46	1.98
Methanol	$CH_3-OH$	32.63	337.5	36.0	34	1.85
Ethanol	$C_2H_5-OH$	24.3	351.3	62.6	67.5	1.58
Isopropanol	$CH_3-CH(OH)-CH_3$	18.3	355.4	64.4	54.5	1.92
Isobutanol	$(CH_3)_2CH-CH_2-OH$	17.7	381.5	67.8	49	2.08
Methyl cellosolve	$CH_3O-(CH_2)_3-OH$	15.09	397.6	54.8	47.5	2.60
Ethyl cellosolve	$C_2H_5O-(CH_2)_3-OH$	13.39	408.1	61.3	52.5	1.85
Butyl cellosolve	$C_4H_9O-(CH_2)_3-OH$	9.4	444.1	64.5	45.5	2.74

acceptor solvents (alcohols, ethers). The activity of hydrogen decreases as a result of occurrence of protolysis in such media, and the rate of hydrolysis of tetraethoxysilane is retarded. The solvents in rate of occurrence of reaction can be arranged in the series: ketones > alcohols > Cellosolves.

Being present as the intermicellar liquid between globules of the formed polyalkoxysilanes, the solvents change their packing density and surface energy. This shows up on the structure of xerogels were detected by the method of complex thermal analysis from the shift in exo effects of their destruction in the region of 533-623 and 673-743 K (Fig. 1).

An increase in the length of the molecular chain of the solvent, used during hydrolysis of tetraethoxysilane, leads to a shift of exo effects on thermograms of xerogel destruction from 20 to 70 K in the direction of lower temperatures. This fact indicates a decrease in degree of structurization of the formed alkoxysiloxanes [6]. A low decomposition temperature (1 exo peak at  $T = 503-543 K$ ) and higher mass losses (Table 2) are characteristic for xerogels with a lower degree of substitution of ethoxy groups.

The IR spectroscopic method (Fig. 2) was used to obtain more complete information on the composition and structure of the obtained xerogels. It is known that polysiloxanes possess several types of vibrations, which give intense absorption bands, very sensitive to structural changes in the polysiloxane skeleton [7]. The band in the region of  $1000-1200 cm^{-1}$ , belonging to antisymmetric stretching vibrations of the siloxane bond, which has two maxima at  $1080$  and  $1170 cm^{-1}$ , was of interest in this case. Absorption bands in the region of  $3200-3400$  and  $800 cm^{-1}$  are present in all spectra of xerogels, due to stretching vibrations of the Si-OH band, in addition to a band with maximum at  $960 cm^{-1}$ , belonging to vibrations of the Si-OC group. The presence of unhydrolyzed ethoxy groups can be determined from absorption bands in the region of  $2800-2990 cm^{-1}$ , which belong to vibrations of the C-H bond [8]. A comparative analysis of spectra shows that the composition and structure of xerogels depend significantly on the nature of the organic solvent, in the medium of which TEOS hydrolysis occurs, and primarily on the rate of its vaporization - a quantity, inverse to the boiling point.

Spectra of xerogels, obtained from low-boiling ( $<373 K$ ) solvents, in contrast to spectra of xerogels, formed from a medium of average - ( $373-423 K$ ) and high-boiling ( $>423 K$ ) solvents, are characterized by a more intense absorption band in the region of  $1000-1200 cm^{-1}$  and by the particularly significant intensity of the maximum at  $1080 cm^{-1}$ , characteristic for formation of polysilicic acid. On the other hand, broadening of the band of antisymmetric vibrations of siloxane bonds and an increase in intensity of the maximum at  $1170 cm^{-1}$  in xerogels, obtained from average- and high-boiling solvents (low vaporization rate) are a demonstration of the more complex composition of the xerogel, probably consisting of a mixture of polysilicic acids and polyorganosiloxanes of various compositions. Not only a high content of ethoxysilanol in the xerogel composi-

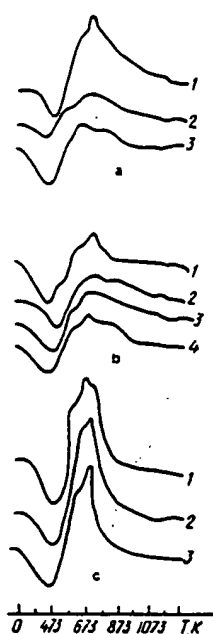


Fig. 1

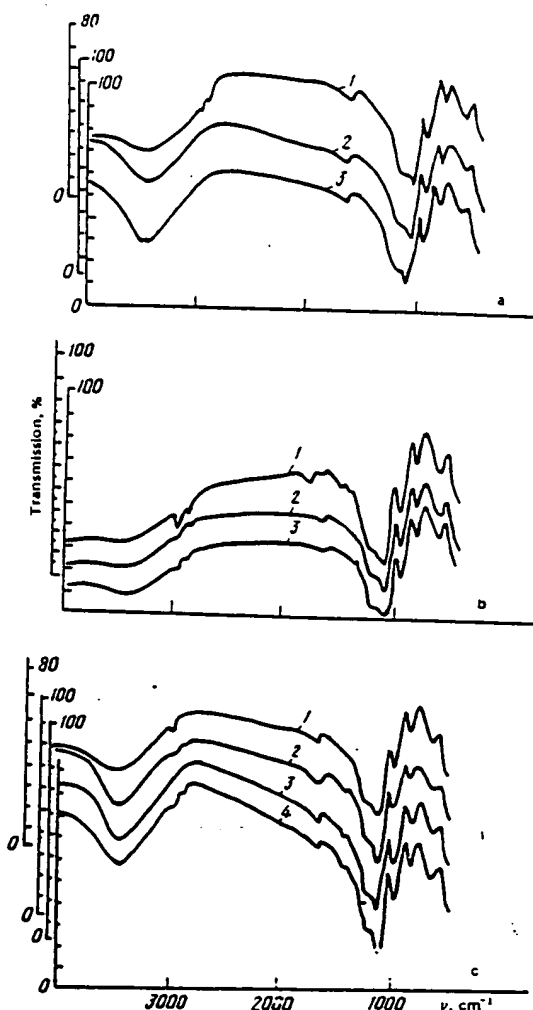


Fig. 2

Fig. 1. DTA of silicic acid xerogels, obtained from ketones (a), alcohols (b), and Cellosolves (c). a: 1) Methyl isobutyl ketone; 2) methyl ethyl ketone; 3) acetone; b: 1) isobutanol; 2) isopropanol; 3) ethanol; 4) methanol; c: 1) butyl; 2) ethyl; 3) methyl Cellosolves.

Fig. 2. IR spectra of silicic acid xerogels, obtained from ketones (a), Cellosolves (b), and alcohols (c). a: 1) Methyl isobutyl ketone; 2) methyl ethyl ketone; 3) acetone; b: 1) butyl; 2) ethyl; 3) methyl Cellosolves; c: 1) isobutanol; 2) isopropanol; 3) ethanol; 4) methanol.

tion, but also an increase in their interaction by way of hydrogen bonds [9], can be determined from band broadening in the region of  $3200-3400\text{ cm}^{-1}$ .

A joint examination of bands at  $960$  and  $800\text{ cm}^{-1}$ , corresponding to vibrations of Si-OC and Si-OH bonds, makes it possible to obtain information on the degree of hydrolysis of ethoxyl groups [7]. However, in this case this is hindered by the fact that the band at  $960\text{ cm}^{-1}$  is overlapped by the band of stretching vibrations of the Si-ONa bond [10], which appears because of the use of sodium bisulfate as the hydrolysis catalyst. Therefore, it was more expedient to examine bands in the region  $2800-2990\text{ cm}^{-1}$ , which characterize the presence of ethoxyl groups at the silicon atom.

It is seen from Fig. 2 that bands in this region are quite strong in all spectra of xerogels, obtained from average- and high-boiling solvents (Cellosolves, methyl iso-

Table 2

Mass Losses of Xerogels of Tetraethoxysilane  
Hydrolyzates, Obtained in a Medium of  
Organic Solvents

Solvent	Total mass loss, %	SiO <sub>2</sub> , %	Mass loss in the temperature range, K		
			293-473	473-873	873-1273
Acetone	17.63	82.37	9.06	7.06	1.51
Methyl ethyl ketone	18.7	81.3	9.35	8.425	0.935
Methyl isobutyl ketone	22.91	77.69	10.941	10.41	1.56
Methanol	18.14	81.86	7.77	9.33	1.04
Ethanol	17.05	82.95	9.82	6.7	—
Isopropanol	16.49	83.51	8.38	7.59	0.52
Isobutanol	18.97	81.03	10.39	7.8	0.78
Methyl cellosolve	24.94	75.06	8.31	15.59	1.04
Ethyl cellosolve	19.32	80.68	8.36	9.92	1.04
Butyl cellosolve	27.87	72.13	11.46	15.11	1.30

butyl ketone, isobutyl alcohol). Their intensity decreases significantly upon going to low-boiling solvents, which indicates the greater degree of hydrolysis of tetraethoxysilanes in a medium of these solvents and agrees with data of calorimetric and complex thermal analyses. The small shift of bands in this region (differing as a function of the type of solvent) is probably a result of autoassociation of solvents with the hydrolysis products. The shift of the strong absorption band of Si-OC vibrations ( $980\text{ cm}^{-1}$ ) by  $20\text{--}25\text{ cm}^{-1}$  in the direction of lower frequencies ( $955\text{--}960\text{ cm}^{-1}$ ) can serve as additional confirmation of complexing with the solvent due to unshared electron pairs of the ethoxy-group oxygen [9].

Thus, the rate and degree of hydrolysis of tetraethoxysilane and also the composition and structure of the final products (silicic acid xerogels) for obtaining binders of various designations can be purposefully regulated by changing the nature of the solvent. The effectiveness of attack of the silicon atom with a nucleophilic reagent depends both on the acceptor properties of the silicon atom itself and on the solvating ability of the solvent, and also on steric hindrances, resulting from the size of its molecules.

## REFERENCES

1. M. I. Karyakina, Physicochemical Fundamentals of Formation and Ageing Processes of Coatings [in Russian], Khimiya, Moscow, 1980.
2. V. M. Potapov (Editor), Organic Course. Practical Course in Organic Chemistry [Russian translation], no. 1, Mir, Moscow, 1979.
3. Yu. Ya. Fialkov, A. N. Zhitomirskii, and Yu. A. Tarasenko, Physical Chemistry of Nonaqueous Solutions [in Russian], Khimiya, Leningrad, 1973.
4. O. V. Tikhonova and E. P. Andreeva, "The investigation of hydrolysis processes of ethoxysilanes," Zhurn. prikl. khimii, vol. 56, no. 1, pp. 145-152, 1983.
5. R. Bates, Determination of pH. Theory and Practice [Russian translation], B. N. Nikol'skii (Editor), Khimiya, Leningrad, 1972.
6. K. L. Andrianov, V. S. Pankov, G. L. Sloninskii, et al., "Thermogravimetric investigation of the depolymerization process of polydimethyl-siloxane in vacuum," Vysokomolekulyar. soedineniya, A., vol. 11, no. 9, pp. 2030-2042, 1963.
7. E. N. Yurchenko, L. E. Merkul'eva, and B. Sh. Tankevich, "The use of IR spectroscopy for control of the ethyl silicate hydrolysis processes," Liteinoe proizvodstvo, no. 4, pp. 44-46, 1970.
8. Ch. Tenford, Physical Chemistry of Polymers [Russian translation], G. L. Sloninskii (Editor), Khimiya, Moscow, 1965.
9. N. D. Sokolov (Editor), The Hydrogen Bond [in Russian], Nauka, Moscow, 1981.
10. M. G. Voronkov, V. P. Mileshevich, and Yu. A. Yuzhelevskii, The Siloxane Bond [in Russian], Nauka, Novosibirsk, 1976.

4 June 1985

Kiev Polytechnical Institute



Art Unit: 1762

***Election/Restriction***

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
  - I. Claims 1-29, drawn to a method of forming a coating, classified in class 427, subclass 387.
  - II. Claims 30-31, drawn to an article, classified in class 428, subclass 446+.

2. The inventions are distinct, each from the other because of the following reasons:

Inventions of Group I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case, the product or article as claimed can be made by a materially different process, such as one in which a free-standing sheet is laminated to the substrate.

Art Unit: 1762

3. This application contains claims directed to the following patentably distinct species of the claimed invention:

a) where the alkoxysilane gel composition is formed by exposing the alkoxysilane to water vapor (Claim 7);

b) where the alkoxysilane gel composition is formed by exposing the alkoxysilane to base vapor (Claim 8);

c) where the alkoxysilane gel composition is formed by exposing the alkoxysilane to water vapor and base vapor (Claim 9);

d) where the alkoxysilane gel composition is formed by depositing the alkoxysilane and organic solvent as a stream (Claim 10);

e) where the alkoxysilane gel composition is formed by depositing the alkoxysilane and organic solvent and water as a stream (Claim 11);

f) where the alkoxysilane gel composition is formed by depositing the alkoxysilane and organic solvent and base catalyst as a stream (Claim 12);

Art Unit: 1762

g) where the alkoxysilane gel composition is formed by depositing the alkoxysilane and organic solvent and water and base catalyst (Claim 13);

Applicant is required under 35 U.S.C. 121 to elect a single disclosed species for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable. Currently, Claim 1 is generic.

Applicant is advised that a reply to this requirement must include an identification of the species that is elected consonant with this requirement, and a listing of all claims readable thereon, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which are written in dependent form or otherwise include all the limitations of an allowed generic claim as provided by 37 CFR 1.141. If claims are added after the election, applicant must indicate which are readable upon the elected species. MPEP § 809.02(a).

Should applicant traverse on the ground that the species are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

Art Unit: 1762

4. During a telephone conversation with Richard Roberts on April 6, 1999 a provisional election was made with traverse to prosecute the invention of Group I and species c), claims 1-6, 9, 14-29. Affirmation of this election must be made by applicant in replying to this Office action. Claims 7-8, 10-13 and 30-31 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.
  
5. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a petition under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Emma Cameron  
AU 1762

**U.S. Supreme Court**

5

**SINCLAIR & CARROLL CO. v. INTERCHEMICAL CORPORATION, 325 U.S.  
327 (1945)**

10 **325 U.S. 327**

**SINCLAIR & CARROLL CO., Inc.,**

**v.**

**INTERCHEMICAL CORPORATION.**

**No. 656.**

15

**Argued April 5, 1945.**

**Decided May 21, 1945.**

Mr. William D. Mitchell, of New York City, for petitioner.

20 Mr. Robert W. Byerly, of New York City, for respondent.

Mr. Justice JACKSON delivered the opinion of the Court.

This infringement suit was brought by the assignees of a patent on a printing ink.

Respondent, Interchemical Corporation, asserts that inks made by the petitioner infringe

25 on claims 3, 10, 11, 12 and 13 of U.S. Patent No. 2,087,190 which was issued to Albert  
E. Gessler on July 13, 1937. Claim 3, which is typical, is as follows: 'A print- [325 U.S.

327, 328] ing ink which is substantially non-drying at ordinary temperatures and dries  
instantly on heating of the printed matter, consisting of coloring matter dispersed in an  
organic viscous vehicle consisting of a liquid component and a solid component

30 completely dissolved in the liquid component in sufficient quantity to give the ink the  
consistency of an ordinary oil-varnish printing ink-the solid component being a member

of the group consisting of natural and synthetic resins and cellulose compounds, substantially all of the liquid component having a vapor pressure at 20 C. as low as that of diethylene glycol monobutyl ether at 20 C., and the major part of the liquid component having vapor pressure which at 150 C. approximates that of ethyl alcohol at ordinary  
5 temperatures and forming a stable solution with the solid component.' In other words, Gessler claims to have invented an ink which will not dry at room temperature but which will dry instantly upon the application of heat after printing. Such an ink is of no particular value in the printing of newspapers or other publications which use absorbent paper. This can be done acceptably with ordinary inks containing linseed oil which is  
10 non- volatile at all relevant temperatures. The paper absorbs the ink when one side is printed, and the other side can be printed immediately without danger of smudging.

But the ink disclosed in the patent does have utility in the printing of magazines and other materials which use smooth non-absorbent paper. Since its disclosure by Gessler, it or  
15 similar inks which are claimed to infringe, have been used to print 'The New Yorker', 'Collier's', and 'The Saturday Evening Post.' Such publications previously would require considerably more time for printing since the reverse side of the paper which they used could not be printed until the first side was dry. Nor could the sheets be stacked or folded without danger of 'offset' printing. The smooth paper would not absorb the linseed- [325  
20 U.S. 327, 329] oil inks, and delay of from one to twenty-four hours was necessary before printing was sufficiently dry to allow the sheets to be worked upon again.

Many efforts were made to eliminate the necessity for delay. The problem was complicated by the fact that the presses used in this kind of printing are equipped with a  
25 long series of ink-distributing rollers to spread out the ink to the optimum thin film before it is applied to the type. Hence, when inks with volatile components were used, they would dry on the rollers before they got to the type. And if inks with nonvolatile ingredients-like linseed oil-were used, they would not dry except by slow oxidation. Other approaches to the solution of the problem included the exposure of sheets printed  
30 from linseed-oil inks to ozone, but that process was dangerous and not wholly

satisfactory. Gessler's ink combines the qualities of an ink which does not dry on the rollers and one which dries quickly after printing when heat is applied to it.

These characteristics of the ink result from the nature of the solvent which is one of its components. Gessler, in his specification, named butyl carbitol (diethylene glycol

5 monobutyl ether is said to be the more accurate scientific term) but that compound was given only as an example, and most of the inks which his company now makes contain 'narrow cuts' of petroleum in place of butyl carbitol. A narrow cut of petroleum consists of only a few kinds of hydrocarbons, and consequently evaporates consistently since each of the hydrocarbons has substantially the same vapor pressure curve. The allegedly  
10 infringing inks similarly are made with narrow cuts of petroleum. All of these solvents have the peculiar quality of being relatively non-volatile at ordinary room temperature but highly volatile at a temperature of 150 C., a temperature to which paper can safely be heated without burning. There is no question that inks containing these solvents have enabled magazines to be printed on high- speed ro- [325 U.S. 327, 330] tary presses  
15 which are furnished with heating devices, without interruption for drying.

The District Court held Gessler's patent invalid because anticipated by the prior art, and held that the petitioner's inks did not infringe. *Interchemical Corporation v. Sinclair & Carroll Co.*, 50 F.Supp. 881. The Circuit Court reversed, holding the patent valid and infringed. *Interchemical Corporation v. Sinclair & Carroll Co.*, 2 Cir., 144 F.2d 842. We  
20 granted certiorari. 323 U.S. 705 , 65 S.Ct. 278.

There has been a tendency among the lower federal courts in infringement suits to dispose of them where possible on the ground of non- infringement without going into the question of validity of the patent. *Irvin v. Buick Motor Co.*, 8 Cir., 88 F.2d 947, 951;  
25 *Aero Spark Plug Co. v. B.G. Corp.*, 2 Cir., 130 F.2d 290; *Franklin v. Masonite Corp.*, 2 Cir., 132 F.2d 800. It has come to be recognized, however, that of the two questions, validity has the greater public importance, *Cover v. Schwartz*, 2 Cir., 133 F.2d 541, and the District Court in this case followed what will usually be the better practice by inquiring fully into the validity of this patent.

A long line of cases has held it to be an essential requirement for the validity of a patent that the subject-matter display 'invention', 'more ingenuity ... than the work of a mechanic skilled in the art.' Hicks v. Kelsey, 18 Wall. 670; Slawson v. Grand Street R. Co., 107 U.S. 649, 2 S.Ct. 663; Phillips v. Detroit, 111 U.S. 604, 4 S.Ct. 580; Morris v.

5   McMillin, 112 U.S. 244, 5 S.Ct. 218; Saranac Automatic Machine Corp. v. Wirebounds Patents Co., 282 U.S. 704, 51 S.Ct. 232; Honolulu Oil Corp. v. Halliburton, 306 U.S. 550, 59 S.Ct. 662; Cuno Engineering Corp. v. Automatic Devices Corp., 314 U.S. 84, 90, 62 S.Ct. 37, 40. This test is often difficult to apply; but its purpose is clear. Under this test, some substantial innovation is necessary, an innovation for which society is truly  
10   indebted to the efforts of the patentee. Whether or not those efforts are of a special kind does not concern us. The primary purpose of our patent system is not reward of the individual but [325 U.S. 327, 331] the advancement of the arts and sciences. 1 Its inducement is directed to disclosure of advances in knowledge which will be beneficial to society; it is not a certificate of merit, but an incentive to disclosure. See Hartford Empire  
15   Co. v. United States, 323 U.S. 386, 65 S.Ct. 373, at page 395. Consequently it is not concerned with the quality of the inventor's mind, but with the quality of his product. The patent in suit was not the product of long and difficult experimentation. Although like other patent cases, this has an extensive record, it is hard to see wherein Gessler's invention consists. In 1930, he was asked to make an odorless ink, and he selected from a  
20   catalog of a chemical manufacturer three solvents which the catalog indicated to be relatively odorless. Their vapor pressures, that is, their rates of evaporation at various temperatures, were also listed. He tried inks made with each of the compounds as a solvent and decided that butyl carbitol was the most satisfactory, since it did not dry while on the rollers, at ordinary temperature.

25

The company which had requested the odorless ink, however, found that it was unsatisfactory for other reasons and, after some further effort, Gessler stopped trying to solve that problem. Sometime in 1932, however, the same company asked Gessler whether he could supply them with an ink 'that would be dry after being printed? We can  
30   put it over some kind of heating device.' Gess- [325 U.S. 327, 332] ler's answer was, 'Yes, I think we could. In fact, one of those inks I made for you in the beginning would



do that.' Gessler testified as follows: 'And now, when Mr. Cray came, in the year 1932, and told me that heating units, steam-heated rollers are used on printing presses, that was the last key that I needed for the solution of the problem. I had not known that before, and I knew that if I could apply any heat to the thin film of those inks that they would dry  
5 almost instantaneously. With that in mind that was the mental background, I would say, that I sent this particular ink to Mr. Cray. I did not send him a number of inks or a selection of inks, but I sent him just one specific ind.' And with respect to the solvents he had chosen, Gessler testified further:

10 'Q. What I want to get straight in my mind, Dr. Gessler, is this: You selected these three, is that right? A. That is right.

'Q. Did you select them from a much longer list? A. That is right.

15

'Q. And before you selected them you tried them all out, did you? A. No. You see the list is listed according to the boiling point, and if you followed on I took it from a certain boiling point on upwards.

20

'Q. Oh, I see. You took them out of a long list in accordance with their boiling point? A. That is correct. That was my first indication of evaporation rate.

25

'Q. ... In selecting these three solvents that you referred to, butyl cellosolve, carbitol and butyl carbitol, did you have reference to a Carbide & Carbon Chemicals Corporation catalog? A. I knew them. I don't know if I had reference, but I knew naturally those solvents.

30

'Q. You may have referred to a catalog? A. I may have, certainly. I most probably had the catalog.

5 'Q. You got copies of their catalogs, did you? A. Oh, yes. [325 U.S. 327, 333] 'Q. On the fly-leaf of the Carbide & Carbon catalog there is a list of their products. Do you remember that list (handing to witness)? A. A similar list.

10 'Q. That gives boiling points and vapor pressures? A. It does.

'Q. And you may have selected these three solvents that we are talking about from that list? A. That is possible, although I knew the solvents. I was very conversant with them. I  
15 told you a while ago why.'

Butyl carbitol was first put on the market in 1929, and subsequently was listed in the catalogs of Carbide & Carbon Chemicals Corporation. It cannot be said that Gessler's contribution was a recognition that a solvent having the peculiar qualities of negligible  
20 vapor pressure at room temperature and high vapor pressure at 150 C. was what was needed. Both the circuit court and the district court found that an article written in 1931, referred to as the Hanson article, had posed the problem. 2 It is difficult to believe that if Hanson had known of the qualities of butyl carbitol, if he had had the Carbide & Carbon catalog before him, he or any other person skilled in the art could not have devised the  
25 ink which Gessler claims to have invented. We reach this conclusion even though [325 U.S. 327, 334] Hanson testified in an affidavit introduced in support of a motion for rehearing that he had worked for over a year trying to produce such an ink and did not succeed.

30 The District Court based its judgment on anticipation by prior patents. Most of these pertained to inks which were not used in ordinary printing: Lefferts and Stevens, No.

380,654, issued April 3, 1888, was an ink used for printing on celluloid and other pyroxyline compounds; the Doughty and McElroy patents Nos. 1,439,696 and 1,450,692 issued December 26, 1922 and April 3, 1923 taught an ink which was mainly useful for stamping with metallic inks by means of heated dies. But the Jirousek patent, No.

5 1,954,627, issued April 10, 1934 was for an ordinary printing ink. Jirousek's patent was directed to 'a composition . . . which can set quickly and dry rapidly and also handle and feed properly and distribute freely.' And the patent specifies, 'In the use of such compositions, immediately after the impression is made, heat should be applied, and most advantageously this may be accomplished by a suitable heater, electric, gas, etc.,  
10 arranged on or adjacent the press, so that the delivered printed impression is subjected to a substantial degree of heat to complete the setting action.'

The inks disclosed in these prior patents did not contain the same solvent or solvents similar to those which Gessler recommended and which his company and the petitioners  
15 now use. They had different vapor pressures both at room temperature and at 150 C. But all these patents taught an ink made with a solvent that would be non-volatile at room temperature and highly volatile when heated. Gessler's solvent is undoubtedly more satisfactory than any of the solvents mentioned in these patents, but it must be remembered that all but one of these patents were granted before butyl carbitol appeared  
20 on the market. The fact is that Gessler himself to a large extent has abandoned butyl carbitol and now uses a narrow [325 U.S. 327, 335] cut of petroleum. Even assuming that if Gessler had discovered the compound he would be entitled to a patent, he did not discover it. Reading a list and selecting a known compound to meet known requirements is no more ingenious than selecting the last piece to put into the last opening in a jig-saw  
25 puzzle. It is not invention. The judgment below is reversed.

Mr. Justice BLACK and Mr. Justice DOUGLAS concur in the result.

#### Footnotes

30 [ Footnote 1 ] See the testimony of Commissioner Coe before the TNEC: 'It is not the principal purpose of the patent laws of our country or of any nation to reward an

individual. The purpose is much deeper and the effect much wider than individual gain. It is the promotion of science and the advancement of the arts looking to the general welfare of the Nation that the patent laws hope to accomplish. The individual reward is only the lure to bring about this much broader objective. Every patent granted benefits society by adding to the sum total of human knowledge, but that is not enough, and that alone will not achieve the ultimate goal of the patent system.' TNEC Hearings, Part 3, p. 857.

[ Footnote 2 ] The relevant part of the Hanson article, which appears in the record, is as follows: 'The solvents available have different boiling points ranging through a broad scale, but unfortunately for this problem their vapor pressure curves are nearly parallel. If we choose one from the group with a boiling point well under 250 F. (121 C.), the highest practical heat to apply to a printed sheet, we find that at room temperature its vapor pressure is still so great that drying will progress rapidly. On the other hand, if one is selected with a vapor pressure so low at room temperature that little drying takes place, at 200 to 250 F., we find the boiling point hardly attained or not even reached.

'If we could only flatten the curve of a high boiling solvent with a vapor pressure sure of 1 in. of mercury or less at 80 down to a point where at 30 in. the boiling temperature would be reduced to only 150 or so it would not take us long to compound an ink to meet the general characteristics for a plastic ink set forth above.'

U.S. Supreme Court

—Distinguished Sinclair v Interchemical



5 UNITED STATES v. ADAMS, 383 U.S. 39 (1966)

383 U.S. 39

UNITED STATES v. ADAMS ET AL.

CERTIORARI TO THE UNITED STATES COURT OF CLAIMS.

10 No. 55.

Argued October 14, 1965.

Decided February 21, 1966.

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JUN 23 1966  
TO 2000-10094

15 Respondents sued the Government under 28 U.S.C. 1498 charging infringement and  
breach of contract to compensate for use of a wet battery on which a patent had been  
issued to respondent Adams. The battery consisted of a magnesium electrode (anode) and  
a cuprous chloride electrode (cathode) placed in a container with water to be supplied as  
the electrolyte, providing a constant voltage and current without the use of acids. Despite  
20 initial disbelief in the battery's efficacy by government experts to whose attention Adams  
brought his invention the Government ultimately (but without notifying Adams) put the  
battery to many uses. In opposition to respondents' suit the Government claimed the  
device unpatentable because the use of magnesium and cuprous chloride to perform the  
function shown by Adams had been previously well known in the art and their  
25 combination represented no significant change compared to the prior art wet battery  
designs such as those using a zinc anode and silver chloride cathode for which  
magnesium and cuprous chloride were known substitutes. The Court of Claims adopted  
the Trial Commissioner's finding that the patent was valid and infringed by some of the  
accused devices. Six months later, following respondents' motion to amend the judgment,  
that court found no breach of contract. More than 90 days after the initial judgment but  
30 less than that period after the contract decision, the Government sought a time extension  
for review as to the issue of patent validity. Such review was later granted though service  
on respondents of the petition for writ of certiorari was delayed beyond the time  
prescribed by this Court's rules. Held:

35 1. The petition for certiorari was timely, since the 90-day filing period commenced, not  
with the initial judgment, but with the judgment on the contract issue; nor did failure to  
comply with the Court's rules as to service of the petition bar this review since the service  
requirements therein are not jurisdictional, and no prejudice resulted from the  
Government's inadvertent failure to meet those requirements. Pp. 41-42.

40

2. The Adams patent is valid since it satisfied the separate tests of novelty,  
nonobviousness, and utility required for issuance of a patent. *Graham v. John Deere Co.*,  
45 ante, p. 1. Pp. 48-52. [383 U.S. 39, 40]

3. The Adams battery was novel. Pp. 48-51.

5

(a) The fact that it was water-activated set it apart from the prior art. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, distinguished. Pp. 48-50.

10

(b) The combination of magnesium and cuprous chloride was novel in the light of the prior art. P. 50.

15

(c) The use of magnesium for zinc and cuprous chloride for silver chloride did not involve merely equivalent substitutes, as is evidenced by the fact that the Adams battery had different operating characteristics from those of the batteries relied upon by the Government. Pp. 50-51.

20

4. The Adams battery was nonobvious. Pp. 51-52.

25

(a) Though each of the battery's elements was well known in the prior art, to combine them as Adams did required that a person reasonably skilled in that art ignore that open-circuit batteries which heated in normal use were not practical and that water-activated batteries were successful only when combined with electrolytes harmful to the use of magnesium. Pp. 51-52.

30

35

(b) Noted experts had expressed initial disbelief in the Adams battery. P. 52.

40

(c) In a crowded art replete with a century and a half of advance the Patent Office could find no reference to cite against the Adams application. P. 52.

165 Ct. Cl. 576, 330 F.2d 622, affirmed.

45

Assistant Attorney General Douglas argued the cause for the United States. With him on the brief were Acting Solicitor General Spritzer, Sherman L. Cohn and Edward Berlin. John A. Reilly argued the cause and filed a brief for respondents.

MR. JUSTICE CLARK delivered the opinion of the Court.

This is a companion case to No. 11, *Graham v. John Deere Co.*, decided this day along with Nos. 37 and 43, *Calmar, Inc. v. Cook Chemical Co.* and *Colgate-Palmolive Co. v. Cook Chemical Co.* The United States seeks review of a judgment of the Court of Claims, holding valid and infringed a patent on a wet battery issued to [383 U.S. 39, 41] Adams. This suit under 28 U.S.C. 1498 (1964 ed.) was brought by Adams and others holding an interest in the patent against the Government charging both infringement and breach of an implied contract to pay compensation for the use of the invention. The Government challenged the validity of the patent, denied that it had been infringed or that any contract for its use had ever existed. The Trial Commissioner held that the patent was valid and infringed in part but that no contract, express or implied, had been established. The Court of Claims adopted these findings, initially reaching only the patent questions, 165 Ct. Cl. 576, 330 F.2d 622, but subsequently, on respondents' motion to amend the judgment, deciding the contract claims as well. 165 Ct. Cl., at 598. The United States sought certiorari on the patent validity issue only. We granted the writ, along with the others, in order to settle the important issues of patentability presented by the four cases. 380 U.S. 949. We affirm.

## I.

While this case is controlled on the merits by No. 11, *Graham*, ante, p. 1, respondents have raised threshold issues as to our jurisdiction which require separate handling. They say that the petition for certiorari came too late, contending that the 90-day period for filing began with the date of the initial judgment rather than the date of the decision on the contract issue, citing *F. T. C. v. Minneapolis-Honeywell Co.*, 344 U.S. 206 (1952). We cannot agree; first, because that case did not involve a timely motion to amend the judgment 1 and, secondly, because here the Government's liability was inextricably [383 U.S. 39, 42] linked with the alleged contract action which was not determined until the latter judgment. Nor is there merit in respondents' contention that the Government failed to comply with the requirements of our Rules 21 (1) and 33 as to service, since these requirements are not jurisdictional, no prejudice resulted and the failure was inadvertent. We turn now to the merits.

## II.

### The Patent in Issue and Its Background.

The patent under consideration, U.S. No. 2,322,210, was issued in 1943 upon an application filed in December 1941 by Adams. It relates to a nonrechargeable, as opposed to a storage, electrical battery. Stated simply, the battery comprises two electrodes - one made of magnesium, the other of cuprous chloride - which are placed in a container. The electrolyte, or battery fluid, used may be either plain or salt water. The specifications of the patent state that the object of the invention is to provide constant voltage and current without the use of acids, conventionally employed in storage batteries, and without the generation of dangerous fumes. Another object is "to provide a battery which is relatively light in weight with respect to capacity" and which "may be

manufactured and distributed to the trade in a dry condition and rendered serviceable by merely filling the container with water." Following the specifications, which also set out a specific embodiment of the invention, there appear 11 claims. Of these, principal reliance has been placed upon Claims 1 and 10, which read:

5 "1. A battery comprising a liquid container, a magnesium electropositive electrode inside the container and having an exterior terminal, a fused cuprous chloride electronegative electrode, and a terminal connected with said electronegative electrode." [383 U.S. 39, 43]

10 "10. In a battery, the combination of a magnesium electropositive electrode, and an electronegative electrode comprising cuprous chloride fused with a carbon catalytic agent."

15 For several years prior to filing his application for the patent, Adams had worked in his home experimenting on the development of a wet battery. He found that when cuprous chloride and magnesium were used as electrodes in an electrolyte of either plain water or salt water an improved battery resulted.

20 The Adams invention was the first practical, water-activated, constant potential battery which could be fabricated and stored indefinitely without any fluid in its cells. It was activated within 30 minutes merely by adding water. Once activated, the battery  
25 continued to deliver electricity at a voltage which remained essentially constant regardless of the rate at which current was withdrawn. Furthermore, its capacity for generating current was exceptionally large in comparison to its size and weight. The battery was also quite efficient in that substantially its full capacity could be obtained over a wide range of currents. One disadvantage, however, was that once activated the  
30 battery could not be shut off; the chemical reactions in the battery continued even though current was not withdrawn. Nevertheless, these chemical reactions were highly exothermic, liberating large quantities of heat during operation. As a result, the battery performed with little effect on its voltage or current in very low temperatures. Relatively high temperatures would not damage the battery. Consequently, the battery was operable  
35 from 65° below zero Fahrenheit to 200° Fahrenheit. See findings at 165 Ct. Cl., at 591-592, 330 F.2d, at 632.

40 Less than a month after filing for his patent, Adams brought his discovery to the attention of the Army and Navy. Arrangements were quickly made for demonstrations [383 U.S. 39, 44] before the experts of the United States Army Signal Corps. The Signal Corps scientists who observed the demonstrations and who conducted further tests themselves did not believe the battery was workable. Almost a year later, in December 1942, Dr. George Vinal, an eminent government expert with the National Bureau of Standards, still expressed doubts. He felt that Adams was making "unusually large claims" for "high watt  
45 hour output per unit weight," and he found "far from convincing" the graphical data submitted by the inventor showing the battery's constant voltage and capacity



characteristics. He recommended, "Until the inventor can present more convincing data about the performance of his [battery] cell, I see no reason to consider it further."

However, in November 1943, at the height of World War II, the Signal Corps concluded that the battery was feasible. The Government thereafter entered into contracts with various battery companies for its procurement. The battery was found adaptable to many uses. Indeed, by 1956 it was noted that "[t]here can be no doubt that the addition of water activated batteries to the family of power sources has brought about developments which would otherwise have been technically or economically impractical." See Tenth Annual Battery Research and Development Conference, Signal Corps Engineering Laboratories, Fort Monmouth, N. J., p. 25 (1956). Also, see Finding No. 24, 165 Ct. Cl., at 592, 330 F.2d, at 632.

Surprisingly, the Government did not notify Adams of its changed views nor of the use to which it was putting his device, despite his repeated requests. In 1955, upon examination of a battery produced for the Government by the Burgess Company, he first learned of the Government's action. His request for compensation was denied in 1960, resulting in this suit. [383 U.S. 39, 45]

### III.

#### The Prior Art.

The basic idea of chemical generation of electricity is, of course, quite old. Batteries trace back to the epic discovery by the Italian scientist Volta in 1795, who found that when two dissimilar metals are placed in an electrically conductive fluid an electromotive force is set up and electricity generated. Essentially, the basic elements of a chemical battery are a pair of electrodes of different electrochemical properties and an electrolyte which is either a liquid (in "wet" batteries) or a moist paste of various substances (in the so-called "dry-cell" batteries). Various materials which may be employed as electrodes, various electrolyte possibilities and many combinations of these elements have been the object of considerable experiment for almost 175 years. See generally, Vinal, Primary Batteries (New York 1950).

At trial, the Government introduced in evidence 24 patents and treatises as representing the art as it stood in 1938, the time of the Adams invention. 2 Here, however, the Government has relied primarily upon only six of these references 3 which we may summarize as follows.

The Niaudet treatise describes the Marie Davy cell invented in 1860 and De La Rue's variations on it. The battery comprises a zinc anode and a silver chloride cathode. Although it seems to have been capable of working in an electrolyte of pure water, Niaudet says the battery was of "little interest" until De La Rue used a solution of ammonium chloride as an electrolyte. Niaudet also states that "[t]he capital advantage of this battery, [383 U.S. 39, 46] as in all where zinc with sal ammoniac [ammonium chloride solution] is used, consists in the absence of any local or internal action as long as the electric circuit is open; in other words, this battery does not work upon itself." Hayes

likewise discloses the De La Rue zinc-silver chloride cell, but with certain mechanical differences designed to restrict the battery from continuing to act upon itself.

The Wood patent is relied upon by the Government as teaching the substitution of magnesium, as in the Adams patent, for zinc. Wood's patent, issued in 1928, states: "It would seem that a relatively high voltage primary cell would be obtained by using . . . magnesium as the . . . [positive] electrode and I am aware that attempts have been made to develop such a cell. As far as I am aware, however, these have all been unsuccessful, and it has been generally accepted that magnesium could not be commercially utilized as a primary cell electrode." Wood recognized that the difficulty with magnesium electrodes is their susceptibility to chemical corrosion by the action of acid or ammonium chloride electrolytes. Wood's solution to this problem was to use a "neutral electrolyte containing a strong soluble oxidizing agent adapted to reduce the rate of corrosion of the magnesium electrode on open circuit." There is no indication of its use with cuprous chloride, nor was there any indication that a magnesium battery could be water-activated.

The Codd treatise is also cited as authority for the substitution of magnesium. However, Codd simply lists magnesium in an electromotive series table, a tabulation of electrochemical substances in descending order of their relative electropositivity. He also refers to magnesium in an example designed to show that various substances are more electropositive than others, but the discussion involves a cell containing an acid which would destroy magnesium within minutes. In short, Codd indicates, by inference, only that magnesium is a theoretically [383 U.S. 39, 47] desirable electrode by virtue of its highly electropositive character. He does not teach that magnesium could be combined in a water-activated battery or that a battery using magnesium would have the properties of the Adams device. Nor does he suggest, as the Government indicates, that cuprous chloride could be substituted for silver chloride. He merely refers to the cuprous ion - a generic term which includes an infinite number of copper compounds - and in no way suggests that cuprous chloride could be employed in a battery.

The Government then cites the Wensky patent which was issued in Great Britain in 1891.

The patent relates to the use of cuprous chloride as a depolarizing agent. The specifications of his patent disclose a battery comprising zinc and copper electrodes, the cuprous chloride being added as a salt in an electrolyte solution containing zinc chloride as well. While Wensky recognized that cuprous chloride could be used in a constant-current cell, there is no indication that he taught a water-activated system or that magnesium could be incorporated in his battery.

Finally, the Skrivanoff patent depended upon by the Government relates to a battery designed to give intermittent, as opposed to continuous, service. While the patent claims magnesium as an electrode, it specifies that the electrolyte to be used in conjunction with it must be a solution of "alcoline, chloro-chromate, or a permanganate strengthened with sulphuric acid." The cathode was a copper or carbon electrode faced with a paste of "phosphoric acid, amorphous phosphorous, metallic copper in spangles, and cuprous chloride." This paste is to be mixed with hot sulfuric acid before applying to the electrode. The Government's expert testified in trial that he had no information as to whether the cathode, as placed in the battery, would, after having been mixed with the other chemicals prescribed, actually [383 U.S. 39, 48] contain cuprous chloride.

Furthermore, respondents' expert testified, without contradiction, that he had attempted to assemble a battery made in accordance with Skrivanoff's teachings, but was met first with a fire when he sought to make the cathode, and then with an explosion when he attempted to assemble the complete battery.

5

#### IV.

##### The Validity of the Patent.

10 The Government challenges the validity of the Adams patent on grounds of lack of novelty under 35 U.S.C. 102 (a) (1964 ed.) as well as obviousness under 35 U.S.C. 103 (1964 ed.). As we have seen in *Graham v. John Deere Co.*, ante, p. 1, novelty and nonobviousness - as well as utility - are separate tests of patentability and all must be satisfied in a valid patent.

15 The Government concludes that wet batteries comprising a zinc anode and silver chloride cathode are old in the art; and that the prior art shows that magnesium may be substituted for zinc and cuprous chloride for silver chloride. Hence, it argues that the "combination of magnesium and cuprous chloride in the Adams battery was not patentable because it represented either no change or an insignificant change as compared to prior battery  
20 designs." And, despite "the fact that, wholly unexpectedly, the battery showed certain valuable operating advantages over other batteries [these advantages] would certainly not justify a patent on the essentially old formula."

25 There are several basic errors in the Government's position. First, the fact that the Adams battery is water-activated sets his device apart from the prior art. It is true that Claims 1 and 10, supra, do not mention a water electrolyte, but, as we have noted, a stated object of the invention was to provide a battery rendered serviceable by the mere addition of water. While the claims of a [383 U.S. 39, 49] patent limit the invention, and specification cannot be utilized to expand the patent monopoly, *Burns v. Meyer*, 100 U.S. 671, 672  
30 (1880); *McCarty v. Lehigh Valley R. Co.*, 160 U.S. 110, 116 (1895), it is fundamental that claims are to be construed in the light of the specifications and both are to be read with a view to ascertaining the invention, *Seymour v. Osborne*, 11 Wall. 516, 547 (1871); *Schriber-Schroth Co. v. Cleveland Trust Co.*, 311 U.S. 211 (1940); *Schering Corp. v. Gilbert*, 153 F.2d 428 (1946). Taken together with the stated object of disclosing a water-  
35 activated cell, the lack of reference to any electrolyte in Claims 1 and 10 indicates that water alone could be used. Furthermore, of the 11 claims in issue, three of the narrower ones include references to specific electrolyte solutions comprising water and certain salts. The obvious implication from the absence of any mention of an electrolyte - a necessary element in any battery - in the other eight claims reinforces this conclusion. It  
40 is evident that respondents' present reliance upon this feature was not the afterthought of an astute patent trial lawyer. In his first contact with the Government less than a month after the patent application was filed, Adams pointed out that "no acids, alkalines or any other liquid other than plain water is used in this cell. Water does not have to be distilled. . . ." Letter to Charles F. Kettering (January 7, 1942), R., pp. 415, 416. Also see his letter  
45 to the Department of Commerce (March 28, 1942), R., p. 422. The findings, approved and adopted by the Court of Claims, also fully support this conclusion.

Nor is *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327 (1945), apposite here. There the patentee had developed a rapidly drying printing ink. All that was needed to produce such an ink was a solvent which evaporated quickly upon heating. Knowing that

5 the boiling point of a solvent is an indication of its rate of [383 U.S. 39, 50] evaporation, the patentee merely made selections from a list of solvents and their boiling points. This was no more than "selecting the last piece to put into the last opening in a jig-saw puzzle." 325 U.S., at 335. Indeed, the Government's reliance upon *Sinclair & Carroll* points up the fallacy of the underlying premise of its case. The solvent in *Sinclair & Carroll* had no functional relation to the printing ink involved. It served only as an inert carrier. The choice of solvent was dictated by known, required properties. Here, however, the Adams battery is shown to embrace elements having an interdependent functional relationship. It begs the question, and overlooks the holding of the Commissioner and the Court of Claims, to state merely that magnesium and cuprous chloride were individually  
10 known battery components. If such a combination is novel, the issue is whether bringing them together as taught by Adams was obvious in the light of the prior art.

We believe that the Court of Claims was correct in concluding that the Adams battery is novel. Skrivanoff disclosed the use of magnesium in an electrolyte completely different from that used in Adams. As we have mentioned, it is even open to doubt whether  
20 cuprous chloride was a functional element in Skrivanoff. In view of the unchallenged testimony that the Skrivanoff formulation was both dangerous and inoperable, it seems anomalous to suggest that it is an anticipation of Adams. An inoperable invention or one which fails to achieve its intended result does not negative novelty. *Smith v. Snow*, 294 U.S. 1, 17 (1935). That in 1880 Skrivanoff may have been able to convince a foreign  
25 patent examiner to issue a patent on his device has little significance in the light of the foregoing.

Nor is the Government's contention that the electrodes of Adams were mere substitutions of pre-existing battery designs supported by the prior art. If the use of magnesium [383  
30 U.S. 39, 51] for zinc and cuprous chloride for silver chloride were merely equivalent substitutions, it would follow that the resulting device - Adams' - would have equivalent operating characteristics. But it does not. The court below found, and the Government apparently admits, that the Adams battery "wholly unexpectedly" has shown "certain valuable operating advantages over other batteries" while those from which it is claimed  
35 to have been copied were long ago discarded. Moreover, most of the batteries relied upon by the Government were of a completely different type designed to give intermittent power and characterized by an absence of internal action when not in use. Some provided current at voltages which declined fairly proportionately with time. 4 Others were so-called standard cells which, though producing a constant voltage, were of use principally  
40 for calibration or measurement purposes. Such cells cannot be used as sources of power. 5 For these reasons we find no equivalency. 6

We conclude the Adams battery was also nonobvious. As we have seen, the operating characteristics of the Adams battery have been shown to have been unexpected and to  
45 have far surpassed then-existing wet batteries. Despite the fact that each of the elements of the Adams battery was well known in the prior art, to combine [383 U.S. 39, 52]

them as did Adams required that a person reasonably skilled in the prior art must ignore that (1) batteries which continued to operate on an open circuit and which heated in normal use were not practical; and (2) water-activated batteries were successful only when combined with electrolytes detrimental to the use of magnesium. These long-accepted factors, when taken together, would, we believe, deter any investigation into such a combination as is used by Adams. This is not to say that one who merely finds new uses for old inventions by shutting his eyes to their prior disadvantages thereby discovers a patentable innovation. We do say, however, that known disadvantages in old devices which would naturally discourage the search for new inventions may be taken into account in determining obviousness.

Nor are these the only factors bearing on the question of obviousness. We have seen that at the time Adams perfected his invention noted experts expressed disbelief in it. Several of the same experts subsequently recognized the significance of the Adams invention, some even patenting improvements on the same system. Fischbach et al., U.S. Patent No. 2,636,060 (1953). Furthermore, in a crowded art replete with a century and a half of advancement, the Patent Office found not one reference to cite against the Adams application. Against the subsequently issued improvement patents to Fischbach, supra, and to Chubb, U.S. Reissue Patent No. 23,883 (1954), it found but three references prior to Adams - none of which are relied upon by the Government.

We conclude that the Adams patent is valid. The judgment of the Court of Claims is affirmed.

It is so ordered.

**MR. JUSTICE WHITE** dissents.

**MR. JUSTICE FORTAS** took no part in the consideration or decision of this case.

### Footnotes

[ Footnote 1 ] Where a timely motion is filed, the time in such cases runs from the date of the order overruling the motion. See *Department of Banking v. Pink*, 317 U.S. 264, 267 (1942); *United States v. Crescent Amusement Co.*, 323 U.S. 173, 177 (1944); *Forman v. United States*, 361 U.S. 416, 426 (1960).

[ Footnote 2 ] The references are listed in the opinion of the Court of Claims, 165 Ct. Cl., at 590, 330 F.2d, at 631.

[ Footnote 3 ] Niaudet, *Elementary Treatise on Electric Batteries* (Fishback translation 1880); Hayes U.S. Patent No. 282, 634 (1883); Wood U.S. Patent No. 1,696,873 (1928); Codd, *Practical Primary Cells* (London 1929); Wensky British Patent No. 49 of 1891; and Skrivanoff British Patent No. 4,341 (1880).

[ Footnote 4 ] It is interesting to note in this connection that in testing the Adams cell the Signal Corps compared it with batteries of this type. The graphical results of the comparison are shown in respondents' brief, p. 51.

[ Footnote 5 ] The standard text in the art states: "The best answer to the oft-repeated question: 'How much current can I draw from my standard cell?' is 'None.'" Vinal,

Primary Batteries, p. 212 (New York 1950); see also Ruben U.S. Patent No. 1,920,151 (1933).

[ Footnote 6 ] In their motion to dismiss the writ of certiorari as improvidently granted, respondents asserted that the Government was estopped to claim equivalency of cuprous chloride and silver chloride. We find no merit in this contention and, therefore, deny the motion. [383 U.S. 39, 53]

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**In re Ochiai**  
**U.S. Court of Appeals Federal Circuit**  
**37 USPQ2d 1127**  
**Decided December 11, 1995**

10

**No. 92-1446 Headnotes**

**PATENTS**

15 **1. Patentability/Validity -- Obviousness -- Relevant prior art -- Particular inventions (§ 115.0903.03)**

20 **Patent construction -- Claims -- Process (§ 125.1309)** Application claim for process of making particular cephem compound having antibiotic properties, using particular type of organic acid first disclosed in parent application, is not prima facie obvious over prior art of record, since obviousness inquiry of 35 USC 103 requires comparison of claim's "subject matter as a whole" with prior art "to which said subject matter pertains," since process invention recited in claim specifically

requires use of new, unobvious acid as one of starting materials, and since it would not have been obvious to those of ordinary skill in art to choose particular acid required by claim, which was unknown but for its disclosure in application, as acylating agent for known amine; characterization of specifically claimed acid as "similar" to or "slightly different" from those used in prior art cannot establish obviousness of use of starting material that is new and nonobvious, both in general and in claimed process.

**2. Patentability/Validity -- Obviousness -- In general (§ 115.0901)**

**Patent construction -- Claims -- Process (§ 125.1309)** There is no per se rule that process claim is obvious if prior art references disclose same general process using "similar" starting materials; application of such rule is improper, since it sidesteps particularized obviousness inquiry required by 35 USC 103 and necessarily produces erroneous results.

**3. Patentability/Validity -- Obviousness -- In general (§ 115.0901)** No per se rules of obviousness have been established by precedent, and reliance on any such rules that eliminate need for fact-specific analysis of claims and prior art is legally incorrect and must cease, since use of per se rules in obviousness determination is inconsistent with 35 USC 103, which entitles applicant to issuance of otherwise proper patent unless Patent and Trademark Office establishes that invention, as claimed in application, is obvious over cited prior art, based on specific comparison of that prior art with claim limitations.

**Case History and Disposition:**

Appeal from the U.S. Patent and Trademark Office, Board of Patent Appeals and Interferences; 24 USPQ2d 1265 . Patent application of Michihiko Ochiai, Taiiti Okada, Osami Aki, Akira Morimoto, Kenji Kawakita, and Yoshihiro Matsushita, serial no. 07/462,492, filed January 8, 1990. from decision upholding examiner's rejection of claims 6 through 10, applicants appeal. Reversed.

**Attorneys:**

Harold C. Wegner, Herbert I. Cantor, and Douglas P. Mueller, of Wegner, Cantor, Mueller & Player, Washington, D.C.; Don J. Peltó, of Foley & Lardner, Washington, for appellant. Fred E. McKelvey, solicitor, U.S. Patent and Trademark Office, Nancy J. Linck, solicitor, Lee E. Barrett, John W. Dewhirst, and Richard E. Schafer, associate solicitors, and Albin F. Drost, deputy solicitor, for PTO.

**Judge:**

Before Archer, chief judge, \* Michel, circuit judge, and Carrigan, district judge.\*\*

**Opinion Text**



## Opinion By:

Per curiam. This appeal is from the July 8, 1992, decision of the United States Patent and Trademark Office (PTO) Board of Patent Appeals and Interferences (Board)

5 affirming the examiner's rejection of claims 6 through 10 of Michihiko Ochiai *et al.* 's (collectively "Ochiai") application serial no. 07/462,492, claiming priority from parent application serial no. 642,356, filed December 19, 1975, now U.S. Patent No. 4,098,888 (methods for the manufacture of cephem).

10 *Ex parte Ochiai* , 24 USPQ2d 1265 (Bd. Pat. App. & Int. 1992).

The real party in interest is Takeda Chemical Industries, Ltd., the assignee of any patent issuing from the application. The rejection of the above claims was predicated on an asserted view of the law of obviousness, per 35 U.S.C. Section 103, in view of the  
15 combined teaching of six references. 1 Because, under the legally correct method for determining obviousness, the claimed process is not obvious in view of the cited prior art references, we reverse.

### *The Invention*

20

Ochiai's application is directed to a process for using an acyl side chain from a particular type of organic acid having a 2-aminothiazolyl group, and a particular type of amine to make a particular cephem compound having antibiotic properties.

25 Page 1129

Claim 6, the principal claim on appeal, 2 is as follows:

6. A process for preparing a cephem compound of the formula: wherein R3 is hydrogen  
30 or methoxy, R4 is hydrogen or a residue of a nucleophilic compound, R5 is hydroxyl or a protected hydroxyl, and R5 is hydrogen or a halogen, or a pharmaceutically acceptable salt or ester thereof, which comprises introducing an acyl group of the formula: wherein R5 and R8 are as defined above into the amino group of the molecule of the formula: wherein R3 and R4 are as defined above or a salt or ester thereof. *Id.* at 1266.

35

Ochiai's U.S. Patent No. 4,298,606 covers the cephem compound resulting from the process of claim 6, and Ochiai's U.S. Patent No. 4,203,899 covers the organic acid used in the process of claim 6. *Id.* at 1267. In other words, viewed as of the time the claimed process was invented, claim 6 recites a process of using a new, nonobvious acid to make  
40 a new, nonobvious cephem. The '606 and '899 patents, like the application at bar, claim priority from the December 1975 parent application.

### *The Rejection*

The examiner rejected claims 6 through 10 as obvious in light of the combined teaching  
45 of the six references noted above. All six references, as Ochiai acknowledges, teach the use of a type of acid to make a type of cephem by a standard acylation reaction with the

very same amine recited in claim 6. The examiner explained the rejections thusly in his answer to Ochiai's appeal to the Board: It must again be stressed that the citation of six references is to demonstrate convincingly that a *standard*, *conventional* process of preparing cephalosporin compounds is being claimed. The *only* difference between what is being claimed and the prior art is the selection of a *slightly* different acylation agent [ *i.e.*, acid] to result in a slightly different final product. The *closest* prior art of the six references is represented by the Cook et al. 4,024,133 and, Gregson et al. patent 4,024,134. These two references use [sic, are] quite similar in their disclosure, Cook being the *most* [sic, more] relevant. Both of these references *generically* disclose the "2-amino-thiazolyl" group which appellants seek to introduce. . . . . The examiner recognizes that the *specific* "2 amino thiazolyl" moiety has *not* been *specifically* named in [the] Cook et al [.] patent. However, Cook et al. when viewed from the standpoint of one skilled in the art would recognize the use of "2-aminothiazolyl" if the final products sought were to contain this moiety. This merely states the obvious. . . . .

. The facts presented here are *identical* to those that occurred in the Durden decision (In re Durden 226 USPQ 359 ). The *acylating* agent herein being used has been patented by appellants, see Ochia et al. 4,203,899. The final products have also been patented by appellants which appellants acknowledge, brief page 5 footnote 4.

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The *only* difference between the facts in Durden those Durden [sic] and the instant situation is that appellants have not *admitted* on the record that the process is obvious. Appellants seek to distinguish the Durden decision based on this difference. However, the Durden decision is believed to be controlling because of the *reasoning* used therein and not an admission or lack of admission of the obviousness of the process. The references discussed above abundantly demonstrate the *routineness* of the claimed process. Thus, the Court rejected the argument that a conventional manipulation or reaction was *unobvious* "notwithstanding the specific starting material or resulting product or both, is not to be found in the prior art". (Emphasis in original). Importantly, the examiner conceded the total absence from the prior art of both the acid used and the cephem made in the process recited in claim 6. In addition, the examiner discussed no references containing any suggestion or motivation either (a) to reject known acids and select instead the particular one used in claim 6, or (b) to obtain the particular cephem made according to the process of claim 6. On appeal, the Board affirmed the examiner's rejection. After reviewing the examiner's reliance on *In re Durden*, 763 F.2d 1406, 226 USPQ 359 (Fed. Cir. 1985), and the "standard" nature of the acylation reaction disclosed in the rejected claims, the Board acknowledged Ochiai's contention that the fact that "neither the final product nor the method of introducing the particular [acid] component were known, obvious or even remotely suggested in the prior art . . . should be dispositive of the obviousness of the invention" recited in claim 6. *Ochiai*, 24 USPQ2d at 1267. The Board did not, however, find Ochiai's contention persuasive. According to the Board, [w]e are not here concerned with the patentability of the starting materials, the final compounds or other processes of making the [cephem] compounds. We are concerned only with the claimed process and the patentability thereof. Cases such as *In re Larsen*, 292 F.2d 531, 130 USPQ 209 (CCPA 1961); *In*

re *Albertson* , 332 F.2d 379, 141 USPQ 730 (CCPA 1964) and, particularly, *In re Durden* , *supra* , all of which were directed to processes of making chemical compounds, are controlling herein. . . . In each case, a material A, either known or novel, was subjected to a standard process of reacting with a standard reactant, B, in order to produce the result expected from the reaction of A with B. Indeed in *Albertson* as in the instant case, the only manipulative step of the process is that which is embodied in the word "reacting." *Id.* The Board also rejected Ochiai's assertion that cases such as *In re Pleuddemann* , 910 F.2d 823, 15 USPQ2d 1738 (Fed. Cir. 1990), *In re Mancy* , 499 F.2d 1289, 182 USPQ 303 (CCPA 1974), and *In re Kuehl* , 475 F.2d 658, 177 USPQ 250 (CCPA 1973), are in tension with *Durden* and *Albertson* and counsel allowance of the rejected claims. Distinguishing *Pleuddemann* , *Mancy* , and *Kuehl* as "method of using" rather than "method of making" cases, the Board summarized its decision as follows: In the case before us, appellants have admitted the claims are directed to a process of making a desired AB product. The process steps, "introducing" A into AB or "reacting" A with B are standard processes used by practitioners in the prior art for reacting similar A moieties with the same B moiety. We are in agreement with the examiner that there is nothing unobvious in the particular process chosen and claimed by the appellants. *Ochiai*, 24 USPQ2d at 1270 (emphasis in original). Ochiai appeals, contending that both the examiner and the Board failed to apply the proper test for obviousness established by *Graham v. John Deere Co.* , 383 U.S. 1, 148 USPQ 459 (1966), and its progeny. Specifically, according to Ochiai, both the examiner and the Board, on the assumption that our decision in *Durden* controlled the outcome of the instant case, failed to weigh the specific differences between the claimed invention -- with *all* its limitations -- and the prior art references, the so-called "second *Graham* factor." *See id.* at 17 ("Under Section 103 . . . differences between the prior art and the claims at issue are to be ascertained [.]"). In addition, Ochiai contends that the decisions in *Mancy* and *Kuehl* , which, like all Court of Customs and Patent Appeals decisions, were in banc, limit the decision in *Albertson* to its facts. The Solicitor, while defending the correctness of the Board's conclusion and, unlike the Board itself, doing so in the familiar terms of *Graham* , also asserts that a supposed irreconcilable conflict in our cases -- between *Albertson* and *Durden* , on the one hand, and *Pleuddemann* , on the other -- "makes it very difficult for patent attorneys to give cogent advice to clients or for patent examiners to render consistent decisions on the patentability (under Section 103) of processes involving the use of new and unobvious starting materials." Unlike Ochiai, however, the Solicitor

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asks us to take the opportunity to reaffirm the vitality of *Albertson* and *Durden* in the course of deciding this appeal. **The Issue** The issue before this court is whether the Board erred in upholding the examiner's rejection of claim 6 as obvious under 35 U.S.C. Section 103 in view of *Larsen* , *Albertson* , and *Durden* as interpreted by the PTO when neither the particular acid used nor the particular cephem produced is either taught or suggested by the art that predates the parent application. **The Analysis** The test of obviousness *vel non* is statutory. It requires that one compare the claim's "subject matter as a whole" with the prior art "to which said subject matter pertains." 35 U.S.C.

Section 103. The inquiry is thus highly fact-specific by design. This is so "whether the invention be a process for making or a process of using, or some other process." *Kuehl*, 475 F.2d at 665, 177 USPQ at 255. When the references cited by the examiner fail to establish a *prima facie* case of obviousness, the rejection is improper and will be overturned. *In re Fine*, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). [1] Applying this statutory test to the art of record, we conclude that Ochiai's process invention as claimed is not *prima facie* obvious. The process invention Ochiai recites in claim 6 specifically requires use of none other than its new, nonobvious acid as one of the starting materials. One having no knowledge of this acid could hardly find it obvious to make any cephem using this acid as an acylating agent, much less the particular cephem recited in claim 6. In other words, it would not have been obvious to those of ordinary skill in the art to choose the particular acid of claim 6 as an acylating agent for the known amine for the simple reason that the particular acid was unknown but for Ochiai's disclosure in the '492 application. As one of our predecessor courts had occasion to observe, in a case involving a highly analogous set of facts, "one cannot choose from the unknown." *Mancy*, 499 F.2d at 1293, 182 USPQ at 306. 3 In addition, although the prior art references the examiner discussed do indeed teach the use of various acids to make various cepheems, they do not define a class of acids the knowledge of which would render obvious the use of Ochiai's specifically claimed acid. 4 The Board noted that Ochiai's specifically claimed acid is "similar" to the acids used in the prior art. Likewise, the examiner asserted that the claimed acid was "slightly different" from those taught in the cited references. Neither characterization, however, can establish the obviousness of the use of a starting material that is new and nonobvious, both in general and in the claimed process. The mere chemical possibility that one of those prior art acids could be modified such that its use would lead to the particular cephem recited in claim 6 does not make the process recited in claim 6 obvious "unless the prior art suggested the desirability of [such a] modification." *In re Gordon*, 733 F.2d 900, 902, 221 USPQ 1125, 1127 (Fed. Cir. 1984). As we noted above, the examiner discussed no references containing any suggestion or motivation either (a) to modify known acids to obtain the particular one recited in claim 6, or (b) to obtain the particular new and nonobvious cephem produced by the process of claim 6. In short, the prior art contains nothing at all to support the conclusion that the particular process recited in claim 6 is obvious. [2] In light of the above, the examiner's errors are evident. First, the examiner concluded that one of ordinary skill in the art would "recognize the use of '2-aminothiazolyl' if the final products sought were to contain this moiety." The prior art, however, contains nothing at all to suggest that one seek this concededly nonobvious final product. The examiner erred by indulging in an essentially hindsight comparison of the functioning of the new acid in claim 6 as a precursor to the claimed cephem with that of other acids in the prior art processes that produced other cepheems. Such a comparison uses Ochiai's specification as though it were

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prior art in order to make the claim to a method that uses the nonobvious acid to make the nonobvious cephem appear to be obvious. Second, the examiner incorrectly drew from *Durden*, a case turning on specific facts, a general obviousness rule: namely, that

a process claim is obvious if the prior art references disclose the same general process using "similar" starting materials. 5 No such *per se* rule exists. Mere citation of *Durden*, *Albertson*, or any other case as a basis for rejecting process claims that differ from the prior art by their use of different starting materials is improper, as it

5 sidesteps the fact-intensive inquiry mandated by section 103. In other words, there are not "*Durden* obviousness rejections" or "*Albertson* obviousness rejections," but rather only section 103 obviousness rejections. The Board essentially repeated the examiner's error of sidestepping the particularized inquiry required by section 103 by grounding the rejection on the supposedly "controlling" effect of "[c]ases such as *In re*

10 *Larsen*, *In re Albertson*, and, particularly, *In re Durden*, all of which were directed to processes of making chemical compounds." *Ochiai*, 24 USPQ2d at 1267 (citations omitted). After categorizing the process recited in claim 6 as a "process of making" rather than as a "process for using," the Board reached its conclusion according to the following syllogism: (a) "process of making" claims have led to rejections, as in *Larsen*

15 , *Albertson*, and *Durden*, whereas "process for using" claims have led to allowances, as in *Kuehl*, *Mancy*, and *Pleuddemann*; (b) *Ochiai*'s claim is directed to a "process of making"; (c) therefore, the rejection should be affirmed. *Id.* at 1268-70. This method of analysis is founded on legal error because it substitutes supposed *per se* rules for the particularized inquiry required by section 103. It necessarily produces

20 erroneous results. Moreover, the Board indulged a non sequitur when it grounded its conclusion of obviousness on the assertion that the starting materials recited in claim 6 are "similar" to those of the prior art. The recited acid is nonobvious, having itself been patented based on the parent application. Nor did the Board justify its characterization of "similar [ity]" in any other manner. Similarity is, as we noted above, not necessarily

25 obviousness. *The Alleged Conflict in Our Case Law* Both the Solicitor and *Ochiai* devote substantial portions of their briefs to purported demonstrations that our precedents on the obviousness *vel non* of chemical processes are, if not in conflict, at least in severe tension with one another and thus create unnecessary confusion. Both parties identify the same two sets of three cases as presenting the conflict: *Larsen*,

30 *Albertson*, and *Durden*, upholding rejections on appeal, are said to be inconsistent with *Kuehl*, *Mancy*, and *Pleuddemann*, reversing rejections on appeal. While we agree that *some* generalized commentary found within several of these decisions may present minor tensions, both *Ochiai* and the Solicitor draw far too bleak a picture of the state of our case law. Other language in these cases, like their actual holdings, obviates

35 any real inconsistency. In *Albertson*, the court "reiterate[d] that all of the evidence must be considered on the 'subject matter as a whole,' from the viewpoint of one skilled in the art, in the determination of obviousness, and not simply the patentability of one of the starting reactants in a process." *Albertson*, 332 F.2d at 382, 141 USPQ at 732. Thus, the Board in this case looked to the general result in *Albertson* while ignoring the

40 *Albertson* court's explicit methodology. Every subsequent case that the parties discuss has been grounded on the same analytic principle: namely, that section 103 requires a fact-intensive comparison of the claimed process with the prior art rather than the mechanical application of one or another *per se* rule. See *Pleuddemann*, 910 F.2d at 827, 15 USPQ2d at 1741 ("We repeat that the controlling law is in Section 103 of the statute, which must be applied to the facts of this case."); *Durden*, 763 F.2d at 1411, 226 USPQ at 362 ("Our function is to apply, in each case, Section 103 as written to the

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facts of disputed issues, not to generalize or make rules for other cases which are unforeseeable."); *Mancy* , 499 F.2d at 1292, 182 USPQ at 305 (" [T]he statutory standard of Section 103 for determining obviousness of an invention is whether in view of the prior art the invention as a whole would have been obvious at the time it was made."); *Kuehl* , 475 F.2d at 665, 177 USPQ at 255 ("The test of unobviousness is a statutory test and

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requires comparison of the invention with the prior art in each case. . . ."). As a consequence, these cases do not -- indeed, *cannot* -- present or create conflicting legal rules. They present, instead, applications of a unitary legal regime to different claims and fields of art to yield particularized results. It is thus surprising that the Board relies on *Durden* for a general rule when the *Durden* court expressly cautioned the bar "not to generalize or make rules for other cases." Because the regime of section 103, much like the Fourth Amendment proscriptions against "unreasonable" searches and warrants issued upon less than "probable cause," mandates that legal outcomes turn on the close analysis of facts, reasonable persons may well disagree about the outcome of a given obviousness determination. These disagreements over the application of a legal rule can, however, be transformed into perceived "irreconcilable conflicts" between legal rules only when, as occurred here, examiners, members of the Board, and patent lawyers purport to find competing *per se* rules in our precedents and argue for rejection or allowance of a particular claim accordingly. We acknowledge that some generalized commentary found in these cases reviewing rejections of claims directed to chemical processes may, if viewed in isolation, have inadvertently provided encouragement to those who desire *per se* rules in this area. For example, one case includes an extensive discussion of the conceptual link between the obviousness *vel non* of a chemical composition and the obviousness *vel non* of a process for making the composition. 6 Such discussion, while entirely accurate, may have contributed to the erroneous view that one may determine the obviousness of a chemical process merely by determining whether it is a process for making a composition. As the cases noted above make clear, however, this is not and has never been the law of section 103. Indeed, *Durden* , the very case relied on by the examiner and the Board for a purported *per se* rule, clearly states that there are no such *per se* rules. [3] The use of *per se* rules, while undoubtedly less laborious than a searching comparison of the claimed invention -- including all its limitations -- with the teachings of the prior art, flouts section 103 and the fundamental case law applying it. *Per se* rules that eliminate the need for fact-specific analysis of claims and prior art may be administratively convenient for PTO examiners and the Board. Indeed, they have been sanctioned by the Board as well. But reliance on *per se* rules of obviousness is legally incorrect and must cease. Any such administrative convenience is simply inconsistent with section 103, which, according to *Graham* and its progeny, entitles an applicant to issuance of an otherwise proper patent unless the PTO establishes that the invention *as claimed* in the application is obvious over cited prior art, based on the specific comparison of that prior art with claim limitations. We once again hold today that our precedents do not establish any *per se* rules of obviousness, just as those precedents themselves expressly declined to create

such rules. Any conflicts as may be perceived to exist derive from an impermissible effort to extract *per se* rules from decisions that disavow precisely such extraction. In sum, as we clearly indicated in *In re Dillon* , a recent in banc decision, "[w]hen any applicant properly presents and argues suitable method claims, they should be examined in light of all . . . relevant factors, free from any presumed controlling effect of *Durden* " or any other precedent. 919 F.2d 688, 695, 16 USPQ2d 1897, 1903 (Fed. Cir. 1990) (in banc), *cert. denied* , 500 U.S. 904 (1991). Having compared Ochiai's claims, limited as they are to the use of a particular nonobvious starting material for making a particular nonobvious end product, to the prior art of record, we reverse the rejection of claims 6 through 10 as an incorrect conclusion reached by incorrect methodology. *Reversed* .

### Footnotes

Footnote 1. The references are as follows: U.S. Patent No. 3,167,549 to Hoover; U.S. Patent No. 3,338,897 to Takano *et al.* ; U.S. Patent No. 3,360,515 to Takano *et al.* ; U.S. Patent No. 4,024,133 to Cook *et al.* ; U.S. Patent No. 4,024,134 to Gregson *et al.* ; and Flynn, *Cephalosporin and Penicillins* 83-91 (1972). *Ochiai* , 24 USPQ2d at 1266. Footnote 2. Because Ochiai did not argue the separate patentability of claims 6 through 10 before the Board, all the claims stand (or fall) together. *In re Dillon* , 919 F.2d 688, 692, 16 USPQ2d 1897, 1900 (Fed. Cir. 1990) (in banc), *cert. denied* , 500 U.S. 904 (1991); *In re Kroekel* , 803 F.2d 705, 709, 231 USPQ 640, 642-43 (Fed. Cir. 1986). Footnote 3. In *Mancy* , the applicant claimed a process for using a newly discovered strain of the microorganism *Streptomyces* to produce a known antibiotic by means of conventional aerobic cultivation. 499 F.2d at 1290, 182 USPQ at 304. The examiner rejected the claim, and the Board affirmed the rejection. The court reversed, having concluding that [w]ithout *Streptomyces bifurcus*, strain DS 23,219 , knowledge of which is supplied [only] by appellants' application and availability of which is supplied by appellants' deposit of the microorganism with the Department of Agriculture, one skilled in the art would not find it obvious to produce daunorubicin by aerobically cultivating *Streptomyces bifurcus* . *Id.* at 1292, 182 USPQ at 305. Footnote 4. The prior art teaches the use of thienyl, pyridyl, and isothiazolyl compounds, whereas claim 6 recites the use of 2-aminothiazolyl. Footnote 5. This is most apparent from the examiner's baffling assertions that "a *standard* , *conventional* process . . . is being claimed" and that "[t]he references . . . abundantly demonstrate the *routineness* of the claimed process." Because the claimed process includes as a limitation the use of an acid unknown in the prior art, the prior art can only demonstrate the routineness of a process similar to the claimed one. Similarity is, of course, not necessarily obviousness. Footnote 6. *See Pleuddemann* , 910 F.2d at 827, 15 USPQ2d at 1741 ("From the standpoint of patent law, a compound and all of its properties are inseparable; they are one and the same thing." *In re Papesch* , 50 CCPA 1084, 315 F.2d 381, 391, 137 USPQ 43, 51 (1963). It is the properties of appellant's compounds as bonding/priming agents for certain polymers and fillers or support surfaces that give them their utility. As stated above, the compounds and their use are but different aspects of, or ways of looking at, the same invention and consequently that invention is capable of being claimed both as

new compounds or as a new method or process of bonding/priming. On the other hand, a process or method of making the compounds is a quite different thing; they may have been made by a process which was new or old, obvious or nonobvious. In this respect, therefore, there is a real difference between a process of making and a process of using and the cases dealing with one involve different problems from the cases dealing with the other.").

Footnote \*. Judge Archer assumed the position of Chief Judge on March 18, 1994.

Footnote \*\*. Honorable James R. Carrigan, United States District Court for the District of Colorado, sitting by designation. Judge Carrigan retired from the federal judiciary effective August 19, 1995, and thus took no part in the disposition of this appeal.

- End of Case -



**In re Brouwer**  
**U.S. Court of Appeals Federal Circuit**  
5 **37 USPQ2d 1663**

**Decided December 13, 1995 Precedential Opinion Issued February 8, 1996**  
**No. 92-1225 Headnotes**

10 **PATENTS**

**1. Patentability/Validity -- Obviousness -- Relevant prior art -- Particular inventions** (§ 115.0903.03) Application claims for process of reacting crosslinked resin with ester of alkenesulfonic acid to make sulfoalkylated resin catalyst are not prima  
15 facie obvious over references cited by examiner, which teach generic reaction of compound containing active methylene group with ester of sulfonic acid, since mere fact that device or process utilizes known scientific principle does not alone make that device or process obvious, and since mere possibility that ester or active methylene group-containing compound disclosed in reference could be modified or replaced in manner  
20 that would lead to specific sulfoalkylated resin recited in claims does not render claimed process obvious absent suggestion in prior art that such modification or replacement is desirable.

**2. Patentability/Validity -- Obviousness -- In general** (§ 115.0901)

25 **Patent construction -- Claims -- Process** (§ 125.1309) Examiner erred by resting prima facie case of obviousness for claimed process on purportedly controlling nature of precedent, rather than on particularized findings regarding set of one or more references that would make claimed process obvious, since suitable method claims, if properly presented and argued, should be examined in light of all relevant factors, free from any  
30 presumed controlling effect of precedent. **Case History and Disposition:**

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35 Appeal from the U.S. Patent and Trademark Office, Board of Patent Appeals and Interferences. Patent application of Dirk M. Brouwer and Elizabeth M. Van De Vondervoort, serial no. 07/098,154, filed September 18,

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40 1987, which is division of serial no. 831,398, filed February 20, 1986, now patent no. 4,728,695. From reconsideration decision upholding examiner's rejection of claims 8-27 in application, applicants appeal. Reversed.

**Attorneys:**

45 M.P. Haddican and Dean F. Vance, Houston, Texas, for appellant. Fred E. McKelvey, solicitor (at the time briefs were filed), Richard E. Schafer, Teddy S. Gron, associated

solicitors, Joseph G. Piccolo, assistant solicitor, Harris A. Pitlick, John W. Dewhirst, and Lee E. Barrett, PTO, for appellee.

**Judge:**

5 Before Archer, chief judge, \* Michel, circuit judge, and Carrigan, district judge.\*\*

**Opinion TextOpinion By:**

10 Per curiam. This appeal is from the December 9, 1991, reconsideration decision of the United States Patent and Trademark Office (PTO) Board of Patent Appeals and Interferences (Board), Appeal No. 90-1349. That decision adhered to the Board's March 18, 1991, decision affirming the examiner's rejection of claims 8 through 27 of Brouwer and Van De Vondervoort's (collectively Brouwer) application serial no. 98,154, a division of application serial no. 831,398, filed February 20, 1986, now U.S. Patent No. 15 4,728,695 (crosslinked resins containing thermally stable sulfonic acid groups). The real party in interest is Shell Oil Company, the assignee of any patent issuing from the application. The rejection of the above claims was predicated solely on obviousness, per 35 U.S.C. Section 103, in view of the combined teaching of two references. 1 Because, under the legally correct method for determining obviousness, the claimed process is not 20 obvious in view of the cited prior art references, we *reverse*. **DISCUSSION** *The Invention* Brouwer's application is directed to a process for preparing sulfoalkylated polystyrene-divinylbenzene resins. Claim 8, the principal claim on appeal, 2 is as follows: 8. A process for the preparation of a catalyst comprising an aryl group having a functional substituent group of general formula wherein a is O or 1, b is 1 or 2, d is 1 or 2, e is 01 or 1, b+d+e=3, R 1 represents H or a C1 to C4 alkyl group and M is a proton 25 or another cation; which process comprises the steps of a) reacting (1) a crosslinked resin comprising at least one substituted aryl group having a functional substituent group of general formula wherein a, b, and e have the same meaning as in general formula (I), b+e=2, R 2 is a -CN or a carboxyester group and if b is 2, each R 2 represents a -CN 30 or a carboxyester group, and (2) an ester of an alkenesulfonic acid of general formula wherein R 1 has the same meaning as in general formula (I), and R 3 is a hydrocarbyl group, under conditions suitable for the formation of an addition product of general formula wherein a, b, d, e and R 1 have the same meaning as in general formula (I), b+d+e=3, R 2 has the same meaning as in

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general formula (II) and R 3 has the same meaning as in general formula (III), and then (b) hydrolyzing the addition product of general formula (IV) to produce a compound 40 having a functional group of general formula (I). Brouwer's U.S. Patent No. 4,728,695 covers the sulfoalkylated resins resulting from the process recited in claim 8. In other words, viewed as of the time the claimed process was invented, claim 8 recites a process of reacting a crosslinked resin with an ester of an alkenesulfonic acid to make a new, nonobvious sulfoalkylated resin catalyst. The '695 patent, like the application at bar, 45 claims priority to the February 1986 parent application.

## The Rejection

The examiner rejected claims 8 through 27 in light of the combined teaching of the two references noted above. As Brouwer acknowledges, Distler teaches so-called "Michael addition" reactions 3 in which a vinylsulfonate is reacted with an active methylene group-containing compound. Distler, however, neither discloses nor suggests making a catalyst by reacting an ester of an alkenesulfonic acid with a crosslinked resin; instead, Distler discloses simple, well-defined compounds the derivatives of which would not be expected to exhibit the catalytic activity and thermal stability of the sulfoalkylated resin made according to the process of claim 8. Specifically, the crosslinked resin recited in claim 8, unlike the Distler compound having an active methylene group, has an aryl-pendant -CN or carboxyester functional group. Morrison & Boyd's *Organic Chemistry* broadly discloses Michael addition reactions with two simple hydrocarbons; like Distler, it neither discloses nor suggests reacting an ester of an alkenesulfonic acid with a crosslinked resin. The examiner explained his initial rejections thusly: Process of preparing polymer by using a unsaturated compound with active methylene substrate is well known as shown by Distler or Organic Chem. Applicants' methylene unit (III) possess [es] the characteristics required to carry out reactions of the Michael-type reactions. In re Durden, 226 USPQ 359. Importantly, the examiner discussed no references containing any suggestion or motivation either (a) to use a resin-substituted methylene reactant in the generic addition reaction taught by the cited references, or (b) to obtain the specific sulfoalkylated resin catalyst made according to the process of claim 8. The examiner offered this same explanation, virtually verbatim, in both his final rejection and his answer to Brouwer's appeal to the Board. On appeal, the Board affirmed the examiner's rejection. According to the Board, The basic difference between the claimed Michael addition reaction and reaction "(n)" disclosed on page 304 of Distler is that the latter's methylene reactant is not attached to a resin as called for by the claims. Thus, the examiner considers that although Distler does not disclose the claimed methylene reactant attached to a resin, one skilled in the art would have expected that reacting the same with vinylsulfonic acid would result in the claimed Michael adduct. . . . [O]ne desiring to make a sulfoalkylated resin would have found it obvious to do so via a Michael addition reaction such as reaction "(n)" of Distler by selecting a resin substituted methylene reactant. In other words, the Board concluded that one desiring to make the nonobvious resin resulting from the process recited in claim 8 would know, on the basis of Distler, how to make it. The Board adhered to its decision on reconsideration. Brouwer appeals, contending that both the examiner and the Board failed to apply the proper test for obviousness established by *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), and its progeny. According to Brouwer, both the examiner and the Board, persuaded that our decision in *In re Durden*, 763 F.2d 1406, 226 USPQ 359 (Fed. Cir. 1985), controlled the outcome of the instant case, failed to weigh the specific differences between the claimed invention -- with *all* its limitations -- and the prior art references, the so-called "second *Graham* factor." See *Graham*, 383 U.S. at 17 ("Under Section 103 . . . differences between the prior art and the claims at issue are to be ascertained [.]"). Specifically, Brouwer contends that the Board erred by treating its disclosure -- namely, the sulfoalkylated resin made according

to the process recited in claim 8 -- as prior art, leading it to affirm the examiner's rejection despite the lack of citation to any reference containing a

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suggesting or motivation either (a) to use a resinsubstituted methylene reactant in a generic Michael addition reaction, or (b) to obtain the specific sulfoalkylated resin catalyst made according to the process recited in claim 8. We agree.

### *The Analysis*

The test of obviousness *vel non* is statutory. It requires that one compare the claim's "subject matter as a whole" with the prior art "to which said subject matter pertains." 35 U.S.C. Section 103. The inquiry is thus highly fact-specific by design. This is so "whether the invention be a process for making or a process of using, or some other process." *In re Kuehl* , 475 F.2d 658, 665, 177 USPQ 250, 255 (CCPA 1973). When the references cited by the examiner fail to establish a *prima facie* case of obviousness, the rejection is improper and will be overturned. *In re Fine* , 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1986 (Fed. Cir. 1988). [1] Applying this statutory test to the art of record, we conclude that Brouwer's process invention is not *prima facie* obvious.

Although the prior art references the examiner cited teach a generic chemical reaction of a compound containing an active methylene group with an ester of vinylsulfonic acid, we have made clear that "[t]he mere fact that a device or process utilizes a known scientific principle does not alone make that device or process obvious." *Uni royal, Inc. v. Rudkin- Wiley Corp.* , 837 F.2d 1044, 1053, 5 USPQ2d 1434, 1440 (Fed. Cir. 1988). *See also Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.* , 730 F.2d 1452, 1462, 221 USPQ 481, 489 (Fed. Cir. 1984) (same). Moreover, the mere possibility that one of the esters or the active methylene group-containing compounds disclosed in Distler could be modified or replaced such that its use would lead to the specific sulfoalkylated resin recited in claim 8 does not make the process recited in claim 8 obvious "unless the prior art suggested the desirability of [such] a modification" or replacement. *In re Gordon* , 733 F.2d 900, 902, 221 USPQ 1125, 1127 (Fed. Cir. 1984). Without first knowing Brouwer's claimed process steps or the composition resulting from those steps, there is simply no suggestion in the references cited by the examiner to practice the claimed process. It is therefore not *prima facie* obvious. [2]

The examiner erred by resting his *prima facie* case of obviousness on the purportedly controlling nature of our decision in *Durden* rather than on particularized findings, required by *Graham*, 383 U.S. at 17, regarding a set of one or more references that would make the claimed process obvious, an error the Board failed to correct. As we clearly indicated in *In re Dillon*, a recent in banc decision, "[w]hen any applicant properly presents and argues suitable method claims, they should be examined in light of all . . . relevant factors, free from any presumed controlling effect of *Durden* " or any other precedent. 919 F.2d 688, 695, 16 USPQ2d 1897, 1903 (Fed. Cir. 1990) (in banc), *cert. denied* , 500 U.S. 904 (1991). *See also In re Ochiai* , 72 F3d 1565, 1570, 37 USPQ2d 1127, 1132 (Fed. Cir. 1995) (" [T]here are not ' *Durden* obviousness

rejections' or ' *Albertson* obviousness rejections,' but rather only section 103 obviousness rejections."). Having compared Brouwer's claims to the prior art of record, we reverse the rejection of claims 8 through 27 as an incorrect conclusion reached by incorrect methodology.

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**REVERSED**

10 **Footnotes**

Footnote 1. The references are as follows: Distler, *The Chemistry of Vinylsulfonic Acid [1]*, 4 Angew. Chem. Int'l Ed. 300 (1965); and Morrison & Boyd, *Organic Chemistry* 1179-1181 (4th ed. 1983). Footnote 2. Because Brouwer did not argue the separate  
15 patentability of claims 8 through 27 before the Board, all the claims stand (or fall) together. *In re Dillon*, 919 F.2d 688, 692, 16 USPQ2d 1897, 1900 (Fed. Cir. 1990) (in banc), *cert. denied*, 500 U.S. 904 (1991); *In re Kroekel*, 803 F.2d 705, 709, 231 USPQ 640, 642-43 (Fed. Cir. 1986). Footnote 3. *Michael addition*, named after chemist Arthur Michael (1854-1942), is a standard technique in organic chemistry for reacting a  
20 material having an alpha,beta-unsaturated carbonyl group with a material having an active methylene group.

Footnote \*. Judge Archer assumed the position of Chief Judge on March 18, 1994.  
25 Footnote \*\*. Honorable James R. Carrigan, United States District Court for the District of Colorado, sitting by designation. Judge Carrigan retired from the federal judiciary effective August 19, 1995, and thus took no part in the disposition of this appeal.

- End of Case -

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